

# MALLOPHAGA FROM BIRDS OF CALIFORNIA.

(With Plates V to IX.)

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## INTRODUCTION.

The Mallophaga described and referred to in this paper were collected by Messrs. Snodgrass, Osgood, Brown, and McLain, students of Stanford University, California, Mr. Ed. M. Ehrhorn, Horticultural Commissioner for Santa Clara County, California, and by the senior author, Mr. Kellogg. All of the specimens from birds of the Bay of Monterey, California, were taken by Mr. Kellogg from just-killed birds or freshly made skins collected by Mr. Leverett M. Loomis, Curator of the Department of Ornithology, California Academy of Sciences. The authors desire to acknowledge their obligations to these various collectors.

The sequence of genera in this paper is that adopted in the European monographs and in the papers of the senior author (*Kellogg, New Mallophaga I, 1896*;<sup>\*</sup> *New Mallophaga II, 1896*;<sup>\*</sup> *Mallophaga from Birds of*

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Panama, Baja California, and Alaska, in New Mallophaga III, 1899). The sequence of species in each genus is determined by the hosts, the sequence of hosts being that of the A. O. U. Check-List of North American Birds, 2d. edition, 1895.

### Docophorus.

**Docophorus procax** n. sp. (Plate V, fig. 1).

Many specimens from two Pigeon Guillemots, *Cephus columba* (Bay of Monterey, California). A member of the group *trianguliferi* Piaget (Les Pediculines, p. 113), and most resembling *pilosus* Piaget (ibid, p. 116, pl. x, fig. 4) from a flamingo, *Phaenicopterus antiquorum*, but differing in the hairs of clypeus, of metathorax, shape of abdominal blotches, etc.

Description of the male. Body, length 1.45 mm., width .76 mm.; head comparatively large, with frontal part of clypeus uncolored and expanded; thorax and first segment of abdomen golden brown with darker markings; abdomen oval, pale, whitish medially, with dark brown transverse bands and blackish lateral bands.

Head, length .52 mm., width .54 mm.; conical, temples wide, sides rapidly approaching each other anteriorly; frontal uncolored clypeal space expanded; front straight or feebly concave; no hairs on the rounding uncolored clypeal region but one short marginal prickle at the point where the clypeus begins to swell beyond the sides of the head; a second short prickle before the suture; two dorsal hairs just before the clear uncolored clypeal region; two short prickles in front of the trabeculæ; trabeculæ large, reaching nearly to the end of the second segment of the antennæ, well col-

ored with pale brown, a short prickle at the base; antennæ small, of the same golden brown as the head, with slightly darker markings; eye inconspicuous, with two short prickles and an ocular fleck; temples rounded, with two long hairs and several prickles; occipital margin straight; clypeal signature broadly shield-shaped, sides constricted anteriorly, with posterior angle reaching almost to the mandibles; the quadrangular space in the middle of the signature is slightly darker than the most anterior portion; antennal bands interrupted by the suture, the bands turning in at the suture, nearly meeting on the median line, the bands themselves becoming narrow and acuminate; the posterior ends of the antennal bands bend in and back till they meet the dark blotch caused by the mandibles showing through the head; ocular blotches distinct; temporal borders narrow, occipital bands distinct, slightly diverging anteriorly; occipital border not extending to the sides of the head.

Prothorax broad, with sides diverging; posterior angles rounding; lateral borders dark, extending in along the posterior margin. Metathorax pentagonal, sides strongly divergent, posterior margin angular, with slightly rounding tip on the abdomen; one short prickle and one long pustulated hair in the posterior angles, three pustulated hairs each side of the posterior marginal angle; segment pale in the middle, growing darker laterally and posteriorly. Legs of the same golden brown as the thorax, darker lateral borders and annulations, claws also dark. Sternal markings consist of dark brown intercoxal lines and a pale median metathoracic blotch.

Abdomen broadly ovate, turbinate; segments 2 to 7 with prominent posterior angles, each bearing

from one to three long hairs; segment 1 wholly golden brown, the transverse blotches meeting near the posterior margin in an acute point; the transverse lateral blotches of segments 2 to 7 are separated by a transparent whitish median space; the lateral margins of the segments are dark brown to black; along the posterior margins of the transverse lateral bands are partially uncolored spots bearing long hairs; stigmatal spots distinct; segment 8 wholly pale brown, darker in the middle, owing to the dark genitalia showing through; segment 9 very small and uncolored; genitalia distinct, dark brown reaching as far forward as segment 6.

Female. Body, length 1.62 mm., width .78 mm.; head, length .56 mm., width .53 mm.; abdomen not so broad in comparison with the length as in the male, not turbinated, and the median whitish space larger.

**Docophorus lari** Denny. (See Kellogg, *New Mallophaga*, I, 1896, p. 98, pl. iv, fig. 4).

Specimens from *Larus delewarensis*, *L. occidentalis* (three birds), and *L. heermanni* (two birds) (Bay of Monterey, California). Previously taken by Kellogg from these and other species of *Larus*.

**Docophorus melanocephalus** Burmeister. (See Kellogg, *New Mallophaga*, I, 1896, p. 99, pl. iv, fig. 6).

Two specimens from the Royal Tern, *Sterna maxima* (Bay of Monterey, California), and two specimens from the Pomarine Jaeger, *Stercorarius pomarinus* (Bay of Monterey, California). Previously taken by Kellogg from *Sterna maxima* (same locality).

**Docophorus validus** n. sp. (Plate V, fig. 2).

A single female specimen of this striking *Docophorus* from a Black-vented Shearwater, *Puffinus opisthomelas*

(Bay of Monterey, California). In general shape and in certain special characters this new form somewhat resembles *D. brevi-antennatus* Piaget (Les Pediculines, p. 108, pl. ix, fig. 9) from *Sula australis* (Museum of Leyden); the differences, however, in shape of meta-thorax, abdominal blotches, etc., are marked.

Description of the female. Body, length 2.25 mm., width 1.18 mm.; large triangular head with narrow, emarginate front; abdomen nearly circular, with strongly marked, lateral, transverse blotches, mostly acute inwardly.

Head, length .72 mm., width .72 mm., front of the head before the trabeculæ elongate and markedly narrowing anteriorly; dark lateral margins extending slightly beyond the narrow, concave, uncolored clypeal region, terminating in a sharp, slightly incurving angle; a short prickle on the anterior margin of this projecting angle, a short hair on the lateral margin of the front, near the suture; two dorsal hairs extending beyond the lateral margin of the head; trabeculæ large, reaching to the end of the second segment of the antennæ; segment 1 of the antenna long, segment 5 but little longer than segments 3 or 4; eyes prominent, with a short spine and a hair; temples slightly protruding, parabolic, with two long hairs and three short spines; occipital margin slightly convex upon the prothorax; signature distinct, anteriorly concave; deeper chestnut-brown along the anterior margin than through the wide median portion, posteriorly narrowing into a dark, narrow, acuminate point reaching to the mandibles; the anterior portion of this posterior point is darker than the rest of the signature; antennal bands broad, even, of a dark, rich, golden brown, paling slightly in the anterior portion, beyond the suture; posterior extremities bending inwardly, separated by a

pale median space between the occipital bands; occipital bands much paler than the temporal borders, indistinctly fading anteriorly into dark ocular blotches; temporal margins narrowly bordered with dark brown; occipital blotches distinct.

Prothorax small, oblong; angles rounding, with one long hair; lateral blotches distinct, separated by a pale median line, darker along the posterior margin near the angle, and fading gradually anteriorly. Metathorax only two-thirds as wide as the head, with strongly diverging sides, rounding, posterior angles; posterior margin broadly rounded upon the abdomen; one very short prickle and one long hair in a pale brown space on the posterior angle; six long pustulated hairs on the posterior margin; lateral markings little darker than the general dark brown of the metathorax.

Abdomen nearly circular; transverse, lateral blotches distinct, acute inwardly, and darkest at the inner ends; each bearing from one to four pustulated hairs; segment 8 entirely dark brown; segment 9 rounding, with a narrow, angular emargination; one fine hair each side of this emargination.

**Docophorus icterodes** Nitzsch. (See Kellogg, *New Mallophaga*, I, 1896, p. 96, pl. iv, fig. 1).

Specimens from a Lesser Scaup Duck, *Aythya affinis*, and from an American Scaup Duck, *Aythya marila nearctica* (Palo Alto, California). Previously taken by Kellogg from the first named host species, and from six other duck species.

**Docophorus fusiformis** Denny. (Plate V, fig. 3).

*Monographia Anoplurorum Britanniae*, 1842, p. 84, pl. i, fig. 2.

*Docophorus fusiformis* D., Giebel, *Insecta Epizoa*, 1874, p. 104; Piaget, *Les Pediculines*, 1880, p. 86, pl. vi, fig. 7.

*Docophorus fissiformis* D., Osborn, *Insects Affecting Domestic Animals*, Bull. 5, N. S., Div. of Ent., U. S. Dept. Ag., 1896, p. 217.

One male from a Least Sandpiper, *Tringa minutilla* (Palo Alto, California). Denny's specimens were taken from the same host; Giebel's single specimen from the same host, and Piaget's from *Tringa subarquata*. Osborn's specimens are from the "black-billed sandpiper" (Burnett collection). Our specimen has no emargination of the clypeal front, a character especially noted by Denny and Piaget. But Giebel's specimen is like ours: "der Vorderrand ist nicht tief ausgeschnitten, sondern nur sanft concav." The species can be recognized by the large elongate head, the dark coloration, and narrow genitalia. Our specimen, figured, measures: body, length, 1.31 mm., width .5 mm.; head, length .5 mm., width .44 mm.

**Docophorus fuliginosus** Kellogg.

New Mallophaga, I, 1896, p. 80, pl. iii, fig. 2.

Specimens from the Black-bellied Plover, *Squatarola squatarola*, and from the Semipalmated Plover, *Aegialitis semipalmata* (Pacific Grove, California). Described from *Squatarola squatarola* (Kansas and California).

**Docophorus pictus** Giebel. (Plate V, fig. 4).

Insecta Epizoa, 1874, p. 74.

*Docophorus pictus* G., Piaget, Les Pediculines, 1880, p. 23.

Numerous specimens from a Golden Eagle, *Aquila chrysaetos* (Palo Alto, California). The specimens are of the characteristic group infesting eagles, of which *platystomus* N. (Giebel, Insecta Epizoa, p. 69, pl. ix, fig. 1; Piaget, Les Pediculines, p. 17, pl. i, fig. 1) may be taken as type. So many species have been described in this group, on what seems to us slight differences, that one may well despair of making a satisfactory reference of his specimens to any one of the forms to the exclusion

of all others. From this same host half a dozen species of *Docophorus* (all of the *platystomus* type) have been described.

The truncate, not emarginated, clypeal front, and the slight dilation of the uncolored part of the clypeus lead us to refer our specimens to a species proposed by Giebel for specimens collected from the same host as that of our specimens. Osborn (*Insects Affecting Domestic Animals*, 1896, p. 218,) describes a species *halieti* from the Bald Eagle, *Haliaeetus leucocephalus* (Florida). This species has a marked lateral, anterior, clypeal dilation, and the front is emarginate.

The members of the group may be recognized by the uncolored front of the clypeus more or less dilated. We figure a female. Measurements: Male, body, length 2.22 mm., width 1.2 mm.; head, length .85 mm., width .91 mm. Female, body, length 2.81 mm., width 1.4 mm.; head, length .94 mm., width 1. mm.

***Docophorus cursor* Nitzsch.** (See Kellogg, *New Mallophaga*, II, 1896, p. 484, pl. lxvi, fig. 1).

Specimens from two individuals of the American Long-eared Owl, *Asio wilsonianus*, (Ontario, California). Taken previously by Kellogg from *Bubo virginianus* (Lawrence, Kansas). Recorded by Osborn from *Asio wilsonianus* (Ames, Iowa, and Lincoln, Nebraska).

***Docophorus speotyti* Osborn.**

*Insects Affecting Domestic Animals*, 1896, Bull. No. 5, Div. o  
Ent., U. S. Dept. Ag., p. 222, fig. 144.

Specimens from a Spotted Owl, *Syrnium nebulosum* (La Honda, California). Agrees well with Osborn's description (except that the abdomen is narrow, with subparallel sides in the *female*, while it is more ellipti-



cal, widest at segment 4, in the *male*, just the reverse of the condition according to Osborn).

**Docophorus ceblebrachys** Nitzsch. (See Kellogg, New Mallophaga, II, 1896, p. 485, pl. lxvi, fig 3).

Many specimens from a Snowy Owl, *Nyctea nyctea* (Pullman, Washington). Taken previously by Kellogg from same host (Kansas).

**Docophorus singularis** n. sp. (Plate V, fig. 5).

Specimens from a Nuttall's Woodpecker, *Dryobates nuttallii* (Ione, California). Not like any other woodpecker-infesting *Docophori*, but belongs rather to the group *femorati*.

Description of the female. Body, length 1.43 mm., width .71 mm.; dark chestnut-brown with distinct bands on the head and thorax, angular, lateral, transverse blotches on the abdomen; unique in the possession of bipartite trabeculæ.

Head, length .65 mm., width .53 mm.; large, broadly concave, uncolored clypeal region broad with straight to slightly concave front; one marginal hair in front of distinct suture, two dorsal hairs near the lateral margin, one rather short and stiff, extending forward beyond the clypeal margin, the second very long; two dorsal hairs in front of the trabeculæ; the trabeculæ divided, anterior part short and acutely angulated, extending around the base of the posterior portion of the trabeculæ on the ventral surface, the posterior portion of the trabeculæ nearly as long as the first two segments of the antennæ, about the same width throughout, a deep chestnut-brown at the base, with uncolored tip; antennæ with the first two joints long and about equal, pale golden brown, last three joints darker chestnut-brown,

a few short spines on the joints, especially numerous and strong on the first two joints; eye with one long hair, and near the posterior margin a second long hair; temples rounding, with three long, pustulated, marginal hairs and one short prickle, occipital margin slightly convex; signature distinct, anterior margin concave, with a slight lateral constriction near the anterior angles, posterior angles extended backward, posterior margin extending in a long, acute angle beyond the mandibles; antennal bands distinctly interrupted at the suture, dark chestnut-brown, posterior extremities inward and back, meeting well defined, diverging occipital bands; temples dark chestnut-brown, with narrow blackish margins, interrupted by large pustulations.

Prothorax small, lateral margins strongly rounding; one long pustulated hair in the posterior angle; lateral blotches dark chestnut-brown, separated by a pale median line; blackish lateral borders. Metathorax with strongly divergent lateral margins nearly as wide as the head; a series of long pustulated hairs on the angulated posterior margin; lateral blotches dark, separated by a pale median line which widens distinctly near the middle; bands of blackish brown on the lateral and posterior margins. Sternal markings composed only of the distinct intercoxal lines between the pro- and mesothoracic legs. Legs pale brown with dark bands.

Abdomen broadly ovate, segments distinctly narrowing on the median line; one to three long hairs in the posterior angles; many long, pustulated, dorsal hairs in a transverse series on the posterior margin of each segment; lateral transverse triangular blotches dark chestnut-brown, slightly darker on the lateral margin; median portion of the abdomen uncolored; posterior margin of the transverse blotches interrupted by uncolored pustulations; segment 8 entirely dark brown;

segment 9 narrowly emarginate, rounding, with two short prickles on the posterior margin; two dark lateral blotches separated by a broad uncolored space; genital blotches distinctly dark brown, broadly rounding on segments 5 and 6, posterior margin rapidly tapering to segment 8.

Male same size as female; last segment broadly, flatly rounded, with several long hairs on each side of the bare median third of the posterior margin.

### **Docophorus californiensis** Kellogg.

New Mallophaga, II, 1896, p. 483, pl. lxvi, fig. 6.

Specimens from Williamson's Woodpecker, *Sphyrapicus thyroideus* (El Dorado county, California), the White-headed Woodpecker, *Xenopicus albolarvatus* (El Dorado county, and Kings River Cañon, California), and the Californian Woodpecker, *Melanerpes formicivorus bairdi* (Palo Alto, California). Types collected by Kellogg from *Melanerpes formicivorus bairdi* (Palo Alto, California). The specimens from the El Dorado county birds show narrow heads and bodies, but this is probably due to shrinking in drying, as all the specimens of the small collections from this locality appear to have suffered in the same way.

### **Docophorus rufus** Kellogg.

Mallophaga from Birds of Panama, Baja California and Alaska, in New Mallophaga, III, 1899, p. 7, pl. i, figs. 6 and 9.

Three specimens from an Ash-throated Flycatcher, *Myiarchus cinerascens* (Alameda county, California) and three specimens from another specimen of the same bird species from Ontario, California. Described by Kellogg from *Myiarchus cinerascens nuttingi* (Baja California).

**Docophorus fusco-ventralis** Osborn.

Insects Affecting Domestic Animals, 1896, Bull. 5, N. S., Div  
of Ent., U. S. Dept. of Ag., p. 221.

One specimen from an Ash-throated Flycatcher, *Myiarchus cinerascens* (Palo Alto, California). Osborn's specimens were from the Wood Pewee, *Contopus virens* (Cornell University Collection; Burnett Collection).

Agrees well with Osborn's description, except that the fuscous coloration of ventral aspect is in broad transverse bands separated by distinct, paler sutural bands, instead of being "beneath uniformly dark brown."

**Docophorus communis.** (See Kellogg, New Mallophaga, II, 1896, p. 486, pl. lxvi, fig. 7).

Under this name we group together a large number of very similar forms; or if dissimilar, forms connected by gradatory specimens. These forms are taken from passerine birds and belong to Piaget's group *femorati* (Les Pediculines, p. 53), characterized by the large truncate or feebly convex or weakly emarginated clypeus, with long hair in each anterior angle, by the especially large third pair of legs, and by the conspicuous pustulated hairs of the thorax and abdomen. The marked variation (notably in size of hindmost legs) among individuals from a single bird specimen (let alone bird species) and the series of gradatory forms connecting all the variations manifest in the group make it impossible for us to attempt to distinguish different species in this mass of material. Piaget has, indeed, attempted to define half a dozen varieties of *communis*, but in no very confident manner. The group *femorati* can furnish time-killing work for any student bold enough to undertake its discipline.

*Docophori* of this group, referable to the species *communis*, in its widest sense, have been determined by us

from the following passerine hosts, all from California: Ash-throated Flycatcher, *Myiarchus cinerascens*; Western Flycatcher, *Empidonax difficilis*, two specimens; Mexican Horned Lark, *Otocoris alpestris chrysolæma*; Blue-fronted Jay, *Cyanocitta stelleri frontalis*, three specimens; California Jay, *Aphelocoma californica*; Western Meadow Lark, *Sturnella magna neglecta*; Brewer's Blackbird, *Scolecophagus cyanocephalus*; Pine Siskin, *Spinus pinus*; Western Lark Sparrow, *Chondestes grammacus strigatus*, two specimens; Intermediate Sparrow, *Zonotrichia leucophrys intermedia*; Gambel's Sparrow, *Zonotrichia leucophrys gambelii*, three specimens; Golden-crowned Sparrow, *Zonotrichia coronata*, two specimens; *Spizella* sp.; Western Chipping Sparrow, *Spizella socialis arizonæ*; Bell's Sparrow, *Amphispiza belli*; Samuel's Song Sparrow, *Melospiza fasciata samuelis*, two specimens; California Towhee, *Pipilo fuscus crissalis*, two specimens; Black-headed Grosbeak, *Zamelodia melanocephala*; Western Blue Grosbeak, *Guiraca cærulea eurhyncha*, three specimens; Louisiana Tanager, *Piranga ludoviciana*, two specimens; Cedar Waxwing, *Ampelis cedrorum*; Northern Shrike, *Lanius borealis*; California Shrike, *Lanius ludovicianus gambeli*, two specimens; Cassin's Vireo, *Vireo solitarius cassinii*; Yellow Warbler, *Dendroica æstiva*; Vigor's Wren, *Thryothorus bewickii spilurus*; Plain Titmouse, *Parus inornatus*, three specimens; Audubon's Hermit Thrush, *Turdus aonalaschka auduboni*; Western Bluebird, *Sialia mexicana occidentalis*. Previously taken by Kellogg from sixteen species of passerine birds.

**Docophorus mirinotatus** n. sp. (Plate V, fig. 6).

A female and several immature specimens from a Thurber's Junco, *Junco hyemalis thurberi* (Goat Mt.,

alt. 11,500 ft., Kings River Cañon, California). This Nirmoid form does not much resemble any other *Docophorus* known to us. The strangely emarginated, transverse abdominal blotches are unique.

Description of the female. Body, length 1.65 mm., width .53 mm., slender, Nirmoid in form, with head wider than thorax and almost as wide as abdomen; abdomen yellowish white, with narrow blackish lateral bands, and transverse bands with their anterior margins widely and irregularly emarginated.

Head, length .46 mm., width .43 mm.; clypeus broad, with straight or very slightly concave front; one short hair in the lateral margin near the front, a second longer hair in front of the suture; eye with a long hair; temples flatly rounding, with two very long hairs and two or three prickles; markings indistinct; antennal bands interrupted at the suture; occipital bands widely separated posteriorly but converging rapidly anteriorly, forming a triangle with the mandibles at apex; trabeculae slender, short.

Prothorax narrow, quadrangular, with a long hair in the posterior angle; pale medially, with distinct dark lateral bands. Metathorax with a series of long hairs along the posterior margin which is distinctly angulated on the abdomen; lateral, dark brown borders.

Abdomen slender, elongate-elliptical; from one to three long hairs in the posterior angles of the segments and a dorsal, transverse series of long pustulated hairs on each segment rising near the middle of the segments; segments with median blotches which are widely and irregularly emarginate anteriorly, the blotches also interrupted by the pustulations which fade into the medial emargination; the transverse blotches distinctly darker on the posterior margin just

beneath the uncolored medial space and extending laterally not quite to the lateral bands; distinct narrow blackish bands on the lateral margins; last segment narrowly, angularly emarginate, with a short hair on the posterior margin each side of the emargination, and with pale brown transverse blotches, but no dark bands on lateral margins.

**Docophorus mirus** n. sp. (Plate V, fig. 7).

A few specimens from two Vigor's Wrens, *Thryothorus bewickii spilurus* (Palo Alto, California). Characterized by the very large head and small abdomen, the head being two-fifths as long as the whole body and almost, if not quite, as wide.

Description of the female. Body, length 1.5 mm., width .65 mm.; head very large in proportion to the body, five-sixths as wide as the abdomen and two-thirds as long.

Head, length .56 mm., width .53 mm., broadly conical; uncolored clypeal front slightly concave in the middle, a rather long stiff dorsal hair rising near the lateral margin and extending forward beyond the margin of the head, a short hair on the margin in front of a distinct suture, two rather long hairs before the trabeculæ which reach as far as the end of the second segment of the antennæ; segment 2 of the antennæ long, segment 5 longer than either segment 3 or 4; eye distinct, a long hair on the dorsal surface and a shorter hair arising near the posterior angle; three long hairs and a short prickle on the rounding angle of the temples; occipital margin slightly convex; signature distinct, pale fulvous, anterior margin slightly concave; lateral margins straight, though the dark, narrow lines of the inner bands make it appear that there is a strong

constriction near the anterior margin; posterior angles rounding; posterior margin extending back beyond the mandibles in a dark, narrow point; antennal bands marginal, narrow, dark chestnut-brown, interrupted by the distinct suture, bending in to meet the anterior ends of the occipital bands in an indefinite, pale fulvous band; temples bordered anteriorly with a narrow border of dark chestnut; occipital bands narrow but distinct posteriorly, widely diverging and apparently connecting with the antennal bands.

Prothorax narrow, about half as wide as the head; lateral margin convex, one long pustulated hair in the posterior angles; a narrow lateral border of dark chestnut-brown. Metathorax with sides convex and strongly diverging; a series of long pustulated hairs on the posterior margin which is obtusely angled on the abdomen; lateral margin bordered with dark chestnut-brown. Legs fuscous, with dark fuscous borders and semiannulations; third pair of legs conspicuously large; a few scattered hairs and spines.

Abdomen broadly ovoid, short in comparison with the large head; first three segments longer than the others, their posterior margins more nearly straight; segments 4 to 8 narrowed, especially in the middle; last segment narrowly emarginate; many long pustulated hairs on the abdomen arranged in series on the posterior margin of each segment, especially thick along the middle; three or four short prickles on the lateral margin of the emargination of the last segment; first four segments dark chestnut-brown, segments 5 to 9 paler fuscous.

Male. Body, length 1.46 mm., width .53 mm.; head, length .53 mm., width .5 mm.; last abdominal segment rounded, with a fringe of about ten rather long weak hairs.



## Nirmus.

*Nirmus fusco-marginatus* Denny. (Plate V, fig. 9).

Monograph. Anoplur. Brit., 1842, p. 136, pl. x, fig. 1.

*Nirmus fusco-marginatus* D., Giebel, Insecta Epizoa, 1874, p. 178;

Piaget, Les Pediculines, 1880, p. 202, pl. xvi, fig. 6.

Many specimens of a *Nirmus* which may be referred to as a variety of this species of Denny, from an American Eared Grebe, *Colymbus nigricollis californicus*; also two specimens (rather smaller) from two Pigeon Guillemots, *Cephus columba*, and a single specimen from the American Herring Gull, *Larus argentatus smithsonianus* (all the birds from the Bay of Monterey, California). Denny's types were taken from *Podiceps auritus* (Ireland), and Piaget's specimens from *Podiceps cristatus*. It seems to me that the *Nirmus podicipis* of Denny (Monograph. Anoplur. Brit. p. 142, pl. x, fig. 9) and the *Lipeurus runcinatus* Nitzsch (Giebel, Insecta Epizoa, p. 238) are both referable to *fusco-marginatus*. The antennal characters seem to be the same. As Piaget notes, the differing in the antennæ of male and female makes it difficult to refer the species to *Nirmus*. It is a form showing a transition to *Lipeurus*. Our specimens are one-fourth larger than the types of the species and differ in some minor particulars.

Var. *americanus* Kellogg and Chapman. (Plate V, fig. 9). Female, body, length 2.62 mm., width .81 mm.; head, length .56 mm., width .44 mm. Differs from the species type in having a spine in the posterior angles of the prothorax, and a hair on each lateral half of the posterior margin; the metathorax has six hairs and a spine on each lateral half of the posterior margin. The species is easily recognizable by its long slender body, short, narrow, pointed head, and the black, lateral, triangular, abdominal blotches with brown inward-projecting processes.

**Nirmus pacificus** n. sp. (Plate V, fig. 8).

Two males from a Tufted Puffin, *Lunda cirrhata*; one male from a Black-bodied Shearwater, *Puffinus griseus*; and specimens, males and females, from two Pigeon Guillemots, *Cephus columba*—all the birds from the Bay of Monterey, California. The specimen from *Puffinus* is almost certainly a straggler, as no other specimen was taken from the fifty-five individuals of *Puffinus* examined. The new species belongs to Piaget's group *zonati* (Les Pediculines, p. 187), and is most like *citrinus* (ibid. p. 190, pl. xvi, fig. 8). The metathorax, however, is angulated, not flatly rounded, as with *citrinus*, on the abdomen, and there are other differences.

Description of the male. Body, length 1.46 mm., width .5 mm.; short, broad, Docophoroid in form; light golden brown with conspicuous broad, dark antennal bands and dark brown to black lateral abdominal bands interrupted segmentally.

Head, length .5 mm., width .4 mm.; broadly conical; clypeal front very slightly concave; three marginal hairs on the front, one on the clear portion, and two before the suture; a short marginal prickle in front of the trabeculæ, one dorsal hair just back of the first marginal, a second dorsal hair near the second marginal, two dorsal hairs between the suture and the trabeculæ which are distinct and slightly colored; the antennæ are short, segments 2 and 5 being longer than the others; color, the light golden brown of the head marked with slightly darker brown; eyes inconspicuous, with two short prickles; temples with sides nearly straight, rounding on posterior angles, with one very long hair, one shorter, weaker hair, and two short prickles; occipital margin concave; clypeus with a pale

but distinct pentagonal signature; antennal bands broad and dark, continuing beyond the suture; behind the obtuse posterior angle of the signature a narrow longitudinal uncolored space extending to the mandibles; temples bordered by a very narrow line of dark brown slightly broader just below the eye; a distinct though pale occipital signature.

Prothorax quadrangular, very short, broadly rounded, angles with one rather long hair; pale medially with dark brown lateral margins that bend in along the posterior margin. Metathorax pentagonal with widely diverging sides; posterior angles acute; six hairs in the angle and along the posterior margin; the posterior margin with a distinct elongate angle on the abdomen; dark lateral markings broadest on the posterior angles. Legs pale golden brown with slightly darker marginal markings.

Abdomen slightly elongate-oval, turbinate; posterior margins of segments 1-3 angulated, and anterior margins of segments 6-9 more obtusely angled; lateral angles of segments with one to three hairs; a few hairs on dorsal surface arranged along the posterior margins of the segments; posterior margin of segment 9 broadly rounded, with ten rather long hairs, several shorter hairs on dorsal surface of segment; color of abdomen fuscous; segment 1 without distinct lateral blotches, but segments 2-7 with dark brown to black lateral blotches, darkest in anterior angles and extending along the anterior margin of each segment almost to the median line; segment 8 but little darker in anterior angle, and segment 9 of an even pale fuscous; genitalia distinctly showing through, extending to segment 6.

Female, body, length 1.75 mm., width .6 mm.; head, length .55 mm., width .47 mm.; lateral abdominal

bands distinct, blackish, the posterior part of each segmental portion tapering acuminate; segment 8 without lateral bands; segment 9 widely, angularly emarginate behind, with a single very fine short hair on each obtuse posterior point.

**Nirmus maritimus** n. sp. (Plate VI, fig. 1.)

Many specimens from numerous individuals of the Ancient Murrelet, *Synthliboramphus antiquus*, Cassin's Auklet, *Ptychoramphus aleuticus*, Rhinoceros Auklet, *Cerorhinca monocerata*. Also a single specimen (straggler) from a Pacific Fulmar, *Fulmarus glacialis glupischa*. All of these birds from the Bay of Monterey, California. Resembling *N. citrinus* Nitzsch (Giebel, Insecta Epizoa, p. 177; Piaget, Les Pediculines, p. 190, pl. xvi, fig. 8) from *Alca torda*, but more slender, with elongate head, angulated posterior margin of metathorax, different disposition of hairs of the head, etc.

Description of the female. Body, length 1.96 mm., width .46 mm.; slender, elongate; pale fuscous with darker lateral borders on the head and thorax and broad lateral bands on the abdomen.

Head, length .5 mm., width .37 mm.; narrowly elongate, conical, with clypeal front convex; three marginal hairs, the first one near the front and the third in front of the suture, the second is midway between these; a short prickle in front of the trabeculæ which reach to the end of the first segment of the antennæ; antennæ short, not reaching more than two-thirds of the distance to the occipital margin; segment 2 longer than segment 1, and segment 5 longer than segments 3 or 4; a few short hairs on the segment; eye with a hair and a short prickle; temples with sides nearly parallel; one long hair, one short hair, and three short

prickles on the margin; occipital margin slightly concave; signature distinct, shield-shaped, anterior margin convex, posterior margin produced in a narrow point; antennal bands broad, interrupted by a distinct uncolored suture; the anterior extremities of the antennal bands bend broadly in at the suture, being separated medially by a narrow uncolored line that reaches nearly if not quite to the mandibles; ocular blotch fading inwardly; temporal borders narrow but well defined, broader just below the eye, gradually narrowing till it disappears before the occipital angle; a distinct conical occipital signature showing through from the under side of the head.

Prothorax with sides slightly diverging; posterior angles rounding, with one short hair; marginal borders dark golden brown, darker on the inner margin of the border; interrupted on the posterior margin by a broad pale median line. Metathorax with broadly rounding sides, diverging posteriorly; three hairs in the posterior angles; one long and one short hair on the posterior margin each side of the long, acute, median angle; lateral margins bordered with dark golden brown, darker on the inner margin. Legs pale fuscous with narrow dark marginal bands. Sternal markings consisting of pale fuscous intercoxal markings and a distinct median sternal blotch.

Abdomen narrow, elliptical; sides of the middle segments parallel; posterior angles with from one to two hairs; four dorsal hairs on the posterior margins of the segments, two near the middle and one each side near the lateral margin; transverse bands fuscous; lateral bands deep golden brown, broader anteriorly and extending beyond the suture into the segment in front; segments 2-6 with a pale posterior border; segments

7 and 8 with pale longitudinal median band; last segment narrowly rounding, with a narrow emargination; one short hair on the posterior margin, each side of the emargination; ventral surface with broad transverse median blotches.

Male. Body, length 1.5 mm., width .4 mm.; head, length .46 mm., width .34 mm.; distinctly shorter than the female; abdomen more broadly elliptical; segments 7 and 8 narrowed distinctly in the middle; last segment broadly rounded, with ten long hairs on the posterior margin; transverse bands distinctly dark on segments 1 to 6; last segment evenly pale yellow; genitalia darker brown, extending anteriorly to segment 5.

**Nirmus triangulatus** Nitzsch. (Plate VI, fig. 2).

Zeitschr. f. ges. Naturwiss. (Giebel), 1866, vol. xxviii, p. 378.

*Nirmus normifer* Grube, v. Middendorff's Sibir. Reise, 1851, Zool. i, p. 478, pl. i, fig. 8.

*Nirmus triangulatus* N., Giebel, Insecta Epizoa, 1874, p. 177; Piaget, Les Pediculines, 1880, p. 201, pl. xvi, fig. 5.

Many specimens of this striking *Nirmus* from one out of two birds shot of the Pomarine Jaeger, *Stercorarius pomarinus* (Bay of Monterey, California). Our specimens differ from Piaget's figure in having the head distinctly shorter and narrower in front, giving the insect an appearance markedly different from the effect given by the figure. There is probably no doubt, however, regarding the identity of the species.

Nitzsch's specimens were taken from "*Lestris crepidata*," Grube's from "*Lestris richardsoni*," and Piaget's from *Stercorarius pomarinus* and *Larus canus* (Zool. Garden of Rotterdam).

The species may be readily recognized by the characteristic black, subtriangular, lateral, abdominal blotches, and the chestnut-brown, median, abdominal

blotches (see figure). My specimens measured: Male, body, length 1.8 mm., width .62 mm.; head, length .53 mm., width .53 mm. Female, body, length 2.1 mm., width .63 mm.; head, length .6 mm., width .6 mm.

**Nirmus lineolatus** var. **atri-marginatus**. Kellogg and Chapman (For *lineolatus* see Kellogg, New Mallophaga, I, 1896, p. 113, pl. vi, figs. 7, 8 and 9).

Many specimens from *Larus canus*, *vega*, *brachyrhynchus* and *Rissa tridactyla pollicaris* (Bay of Monterey, California). A readily recognized variety of *lineolatus*, characterized by the presence of black temporal borders, usually strongly marked, sometimes weakly so. Other characters those of *lineolatus*.

**Nirmus punctatus** Nitzsch. (See Kellogg, New Mallophaga, I, 1896, p. 109, pl. vi, figs. 1 and 2).

Specimens from *Larus delewarensis* (Bay of Monterey, California). Taken previously by Kellogg from *Larus occidentalis* (same locality).

**Nirmus giganticola** Kellogg.

New Mallophaga, I, 1896, p. 105, pl. v, fig. 6.

Many specimens from a Short-tailed Albatross, *Diomedea albatrus*, and a single specimen from a Dark-bodied Shearwater, *Puffinus griseus* (Bay of Monterey, California). Described from *Diomedea albatrus* (same locality).

**Nirmus complexivus** n. sp. (Plate VI, fig. 3).

Many taken from the Sanderling, *Calidris arenaria* (Pacific Grove, California); found on every one of fifteen birds shot, and two specimens from a Least Sandpiper, *Tringa minutilla* (Palo Alto, California). This

form belongs to the group *zonati*, of Piaget (Les Pediculines p. 187) and shows but slight differences from several of the species of this group already described, one or two from the same host, indeed; but on the other hand Nitzsch's and Piaget's species differ among themselves but little, and the American specimens differ quite as much from any described species. In fact they are interesting as showing a combination of several characters which are presented as diagnostic of *cingulatus* (the interrupted first abdominal band), *zonarius* (the hairs and spines of the temples, and the head longer than wide), and *scalaris* (the size). In addition they present characters (metathoracic hairs, *et al.*) which are not shown by any one of the described species. I describe the American form therefore as a new species. The group needs revision; probably four or five of the present species should be reduced to varieties of the oldest named form, i. e. *cingulatus*.

Description of the female. Body, length 1.71 mm., width .5 mm.; readily distinguishable by its general dark color, and rounding, uncolored clypeus with the distinct colored signature, on each side of which lie the narrow triangular projections of the anterior ends of the antennal bands; the posterior ends of the antennal bands bend so strongly in at the suture that they mark the fore part of the head off from the hind part into a small cone.

Head, length .4 mm., width .34 mm.; elongate, triangular, with clypeus broadly rounding, the uncolored region slightly expanded beyond the suture; two short hairs on the rounding margin of the uncolored clypeus, one rather long hair in front of the trabeculæ; trabeculæ prominent, angular, reaching beyond the first joint of the antennæ; antennæ short, reaching barely two-



thirds of the distance to the occipital margin, pale fulvous with darker, broad annulations; segment 5 half as long again as segments 3 or 4; eyes distinct, with a hair and an ocular fleck; temples broadly rounding, with three long pustulated hairs, one short hair, and one prickle on the margin; occipital margin straight; clypeal signature constricted anteriorly, with the posterior, lateral angles projecting slightly backward; the posterior angle extending back indistinctly to the mandibles; antennal bands conspicuous, blackish brown, extending into long, paler, triangular projections on the clypeus; the blackish posterior ends extending in, meeting on the median line; ocular blotches contiguous with the dark temporal borders; occipital bands very definite, looking like two dark bars, bending outwards towards the ocular blotch but fading into the dark chestnut-brown of the temples; occipital blotch distinct; a pale transverse space behind the bent antennal bands, running like a curving bar across the head from margin to margin; occipital signature dark fuscous, spear-head-shaped.

Prothorax short, sides rounding; lateral quadrangular blotches separated by a narrow uncolored median line; lateral margin distinctly bordered with dark brown. Metathorax with strongly rounding sides; a short prickle in the anterior angle, a short prickle and a long pustulated hair near the middle of the lateral margin, two long pustulated hairs and two shorter hairs in the posterior angles, two short hairs on the posterior margin; the posterior margin rounding slightly upon the abdomen; strong, dark lateral bands. Legs light fulvous with dark marginal bands. Sternal markings consisting of intercoxal lines extending backward to the tip of the coxa of the second pair of legs;

a median sternal blotch rounding posteriorly with a sharp constriction about midway to the arrow-headed anterior portion.

Abdomen elongate, with one or two slender hairs in the posterior angles of the segments, two strong, pustulated hairs in the posterior margins of the segments; abdomen dark fulvous brown with broad, ill-defined, darker lateral bands, and a transverse linear band along the posterior margin of each segment of a darker brown, adjacent to which are the small uncolored stig-matal spots; the uncolored sutural lines distinct; segment 1 has the transverse band divided by a narrow uncolored median line; segments 8 and 9 more evenly colored; last segment angularly emarginated, with two anal blotches; two short hairs on the posterior margin each side of the emargination.

**Nirmus actophilus** n. sp. (Plate VI, fig. 4).

Many specimens from nine out of fifteen individuals shot of the Sanderling, *Calidris arenaria* (Bay of Monterey, California). A member of Piaget's group *obscurosuturati* (Les Pediculines, p. 169) and resembling somewhat *inequalis* (ibid., p. 176, pl. xv, fig. 1) from *Numenius arquata*.

Description of the female. Body, length 1.59 mm., width .4 mm.; pale, with distinct, narrow, lateral bands of dark brown to black, head darker brown than the thorax, with dark narrow marginal markings.

Head, length .37 mm., width .28 mm.; conical, but little wider through the temples; clypeus broadly rounded, with four marginal hairs, three on the front before the suture, and one long one before the trabeculæ, also a short prickle just at the angle of the trabeculæ; a dorsal hair between the two anterior marginal hairs,

two other dorsal hairs on each side near the anterior extremity of the incurving antennal bands; trabeculæ distinct, reaching nearly to the end of the first segment of the antennæ; antennæ with segment 2 longer than segment 1, and segment 5 longer than segments 3 or 4; color pale fulvous, slightly darker on the last three segments, sutures uncolored, lateral margins slightly darker fuscous; eyes not conspicuous, flattened, with a fine hair and a short prickle; temporal margins slightly rounded, with one long weak hair, one very short hair, and three short prickles; occipital margin concave; clypeal markings distinct, marginal; signature short, distinct anterior margin fading into a broadly rounded posterior angle; behind the signature a transverse linear uncolored space, continuous with the clypeal sutures, forming a distinct uncolored transverse bar across the forehead; antennal bands well defined, bending forward at the clypeal suture into broad, quadrangular ends, posterior extremities bending backward nearly to the distinct ocular blotches, which meet posteriorly the anterior ends of the narrow black temporal borders; occipital blotches small; a distinct, elongate, oval, occipital signature showing through from the ventral side; the mandibles distinctly showing through the head, the œsophageal sclerite showing faintly.

Prothorax with flatly rounded lateral margins, each posterior angle with one pustulated hair; general color pale brown to whitish, with narrow dark lateral bands. Metathorax expanded posteriorly, angles extended, with three long pustulated hairs, and some short weak hairs in the angle and along the lateral third of the posterior margin; posterior margin slightly angulated on the abdomen; narrow black submarginal markings, broadening but less definite on the anterior angles; intercoxal

lines, and a narrow, lanceolate, median, sternal blotch showing through. Legs of an even fuscous, first pair lighter than the second or third pair.

Abdomen elongate, slightly attenuated anteriorly; segments 8 and 9 tapering rapidly; posterior angles acute, each containing from one to three hairs; dorsal surface with a few hairs, four on the posterior margins of segments 1 to 7, two near the middle and two near the lateral margins; ground color pale fawn, gradually growing darker posteriorly, with dark brown lateral bands which send out from their anterior half an indefinite line that partially surrounds the stigmatal spot; segment 9 angularly emarginate, each broadly rounded angle bearing a short bristle; ventral surface with broad transverse bands of dark fawn, which give a darker tone to the paler transverse bands of the dorsal surface; a more definite series of hairs on the posterior margin of the segments than above; segment 8 with a group of three short hairs near the lateral margin.

### **Nirmus cordatus** Osborn.

Insects Affecting Domestic Animals, Bull. 5, N. S., Div. of Ent.,  
U. S. Dept. Ag., 1896, p. 228, pl. ii, fig. *a*.

One female specimen from a Great Marbled Godwit, *Limosa fedoa* (Pacific Grove, California). We had determined this to be an undescribed form, and had partially written a description when Professor Osborn's paper appeared, naming and describing the species from a single female and an immature specimen from the Hudsonian Godwit, *Limosa hæmastica* (Burnett Collection, locality?). Our specimen agrees well with Osborn's description, except that it is somewhat larger, being 2.75 mm., long (Osborn's type 2.44 mm.), and 1.2

mm. wide, (Osborn's type .94 mm.); head, length .7 mm., (Osborn, .66 mm.), width .85 mm., (Osborn, .73 mm.) Osborn's figure, after a photograph, shows the characteristic outline, but we think there is also needed a figure showing the markings which are also very characteristic. The broad rounding anterior emarginations of first two transverse abdominal bands differ notably from the not uncommon narrow angular emarginations of these bands.

**Nirmus incœnis** n. sp. (Plate VI, fig. 5).

A single female from a Black-bellied Plover, *Squat-  
arola squatarola* (Pacific Grove, California). Distinctly  
different from Kellogg's *orarius* (New Mallophaga I,  
1896, p. 104, pl. v, fig. 5) from *Charadrius dominicus*  
(Lawrence, Kansas) or *œophilus* (ibid, p. 107, pl. v,  
fig. 7) from *Ægialitis vocifera* (Lawrence, Kansas).

Description of the female. Body, length 1.65 mm.,  
width .31 mm.; strikingly elongate, narrow; head long,  
with subparallel sides; pale golden brown with very  
narrow blackish lateral borders on the head, thorax, and  
abdomen; an ill-defined brownish band across the  
head in front of the antennal bands.

Head, length .37 mm., width .21 mm.; clypeal front  
broadly rounding, with three marginal hairs about  
equally distant apart, the third just before the suture,  
one hair arising from the dorsal surface, extending be-  
yond the lateral margin of the head, a short fine hair  
in front of the small acuminate trabeculæ, antennæ  
short, segment 2 longer than segment 1, and segment  
5 longer than segments 3 or 4; eye flat, with a  
prickle near its posterior angle; temples with sides  
parallel, with one long hair, one short fine hair, and  
one short prickle on the margin; occipital margin

straight and bare; general color of the head golden brown, a narrow, irregular, marginal border on the clypeal front, darker on the inner margin; a weak brown band across the head in front of the antennal bands, which are narrow and distinctly dark golden brown; small ocular blotches and temples with very narrow dark brown borders.

Prothorax quadrangular, with rounding, posterior angles, each with one hair; transverse blotches golden brown, darker on the lateral margins and in the anterior and posterior angles; a broad, pale, median line separating the transverse blotches. Metathorax more than twice as long as the prothorax, and as wide as the head; sides diverging but little; a slight constriction near the anterior angles; a series of hairs on the rounding posterior margin; same golden brown as the prothorax, a narrow marginal border and a small brown spot in the anterior angles, a narrow but well defined border on the posterior half of the metathorax, the anterior ends bending in, making the slight constriction appear more than it really is. Legs paler golden brown than the thorax, with very narrow marginal borders of dark brown.

Abdomen narrow, elongate, with parallel sides, not tapering till segment 7; segment 1 narrower and shorter than those that follow; posterior angles but little extended, with one or two fine hairs; four long pustulated hairs on the posterior margins of the segments; transverse bands on segments 2 to 8 are golden brown, darkening towards the lateral margins where the lateral band is dark, narrow, and clearly defined; segments 7 to 9 without lateral bands; a pale transverse median band, caused by the uncolored stigmatal spots, thus the transverse blotches appear like two dark bands across each

segment; segment 9 narrowly emarginate, with two pale brown blotches.

**Nirmus opacus** n. sp. (Plate VI, fig. 6).

Several specimens from two individuals of the Semipalmated Plover, *Egialitis semipalmata* (Pacific Grove, California). The new species belongs to the group *bicuspidati* (Piaget, Les Pediculines, p. 184), being in size, outline and marking much like *bicuspis* N. (Giebel, Insecta Epizoa, p. 155, pl. v, figs. 11 and 12; Piaget, Les Pediculines, p. 184, pl. xv, fig. 7) from "*Charadrius minor*," *C. hiaticula* and *Recurvirostra avocetta*.

Description of the male. Body, length 1.11 mm., width .47 mm.; body dark colored all over, with narrow black lateral abdominal bands.

Head, length .4 mm., width .31 mm.; elongate-conical, with broad, rounding front; uncolored clypeal region slightly expanded in front of the suture; five marginal hairs, one in the rounding anterior angle, one just behind this, one at the suture, and two before the trabeculæ; a few dorsal hairs project beyond the margin; trabeculæ distinct, rather slender, acute, prominent for *Nirmus*; antennæ short, not reaching the occipital margin when projected backward, segment 2 longest, segments 3 and 4 short, subequal, segment 5 longer, concolorous with ground color of the head; eyes flat, with a long hair and a fine prickle; temporal margins flatly rounding, with two long hairs and two prickles; occipital margin straight; front of clypeus uncolored; signature large, colored, shield-shaped, from its posterior point a narrow uncolored line runs backward to the mandibles or beyond; antennal bands distinct, blackish brown, interrupted at suture, the part behind the suture curving, with anterior extremity

expanded; hind head separated from fore head by an angulated, rather broad pale transversal space; temples unevenly bordered with blackish brown.

Prothorax quadrangular, with posterior angles nearly rectangular, with one long hair; brown with blackish, even, lateral borders. Metathorax pentagonal, angulated on abdomen; lateral angles with one short hair and three long pustulated hairs, and two long pustulated and one short pustulated on each postero-lateral margin; brown, darker in anterior angles. Legs concolorous with palest color of the thorax, and with narrow dark dorsal margining. Sternal markings composed of distinct intercoxal lines, a linear median blotch on prothorax and a more distinct, larger median blotch on metathorax.

Abdomen elongate-elliptical; posterior angles of segments projecting slightly, with three or four longish hairs beginning with segment 3; dorsal hairs of segment 1 arranged as follows: two on each side of the median line (one in the inner anterior and one in the inner posterior angle of each lateral blotch); segment 2 with four pustulated hairs along the posterior margin; segments 3 and 4 with six pustulated hairs on posterior margin; segments 5 and 6 with two pustulated hairs near the middle of the posterior margin, and a very long hair on the posterior margin near the posterior angles; segment 8 with six pustulated hairs along the posterior margin; segment 9 with eight dorsal hairs and four long marginal hairs; dark brown, with distinct narrow black lateral bands; a narrow uncolored median line reaching nearly to posterior margin of segment 2; the dark brown transverse blotches on segments 6-8 broadly emarginated posteriorly; segment 9 with elongate-elliptical transverse lateral blotches meet-



ing on the median line (there are four pustulated hairs on each blotch); genitalia distinct, extending to posterior margin of segment 4.

Female. Body, length 1.75 mm., width .45 mm.; head, length .47 mm., width .28 mm. Metathorax with but two pustulated hairs on each postero-lateral margin; the narrow uncolored median line extends entirely through segment 2, and slightly into segment 3; segments 3-6 with four pustulated hairs on posterior margin, segment 7 with two median pustulated hairs on posterior margin, and segment 8 with two pustulated hairs in the rounding posterior angles; segment 9 deeply, angularly emarginated, the acute joints with a short prickle.

**Nirmus fuscus** Nitzsch. (See Kellogg, New Mallophaga, II, 1896, p. 499, pl. lxvii, fig. 7).

Specimens from the Western Goshawk, *Accipiter atricapillus striatulus* (Pullman, Washington), the Desert Sparrow Hawk, *Falco sparverius deserticolus* (Palo Alto, California), the Western Red-tailed Hawk, *Buteo borealis calurus* (Palo Alto, California), and the White-tailed Kite, *Elanus leucurus* (Palo Alto, California). Taken previously by Kellogg from *Buteo swainsoni*, *Circus hudsonius* and *Archibuteo lagopus sancti-johannis*, all from Lawrence, Kansas. Recorded by Osborn from *Buteo swainsoni* (Ames, Iowa), and from *Accipiter velox* (locality?).

These specimens combine characters of *fuscus*, *rufus*, *et al.* of Nitzsch, so as to lead us to doubt the distinctness of these various species of Nitzsch. We have with *Nirmus fuscus*, *sens latus*, of the hawks, a repetition of the condition shown by *Docophorus communis* of the passerine birds.

**Nirmus vulgatus** Kellogg.

New Mallophaga, II, 1896, p. 496, pl. lxxvii, fig. 5.

Many specimens from numerous species of passerine birds. This *Nirmus* must be treated like *Docophorus communis*, in that we must group together under one specific name forms rather variant (notably in length and intensity of coloration), without being able as yet to distinguish categorically these variations. Osborn's *pallidus* (Insects Affecting Domestic Animals, 1896, Bull. 5, N. S., Div. of Ent., U. S. Dept. Ag., p. 227). from *Zamelodia ludoviciana* (Ames, Iowa) is probably based on palely colored specimens of this species. The name *N. pallidus*, by the way, is preoccupied (see Piaget, Les Pediculines, 1880, p. 144).

We refer to this species specimens from the Western Blue Grosbeak, *Guiraca caerulea eurhyncha* (4 birds, California); the Western Lark Sparrow, *Chondestes grammacus strigatus* (Ontario, California); the House Finch, *Carpodacus mexicanus frontalis* (Ontario, California); the California Towhee, *Pipilo fuscus crissalis* (2 birds, Palo Alto, California); the Spurred Towhee, *Pipilo maculatus megalonyx* (Palo Alto, California); the Golden-crowned Sparrow, *Zonotrichia coronata* (Palo Alto, California); the Lazuli Bunting, *Passerina amœna* (Palo Alto, California); the Mountain Chickadee, *Parus gambeli* (El Dorado county, California); the Californian Chickadee, *Parus rufescens neglectus* (Palo Alto, California); the Western Bluebird, *Sialia mexicana occidentalis* (Palo Alto, California); the Yellow Warbler, *Dendroica aestiva* (Palo Alto, California); the Lutescent Warbler, *Helminthophila celata lutescens* (Palo Alto, California); the Black-chinned Hummingbird, *Trochilus alexandri* (Ontario, California); the Blue-fronted Jay, *Cyanocitta stelleri frontalis* (King's River

Cañon, California); the American Dipper, *Cinclus mexicanus* (Ontario, California); the Western Flycatcher, *Empidonax difficilis* (2 birds, Ontario, California), and the Ash-throated Flycatcher, *Myiarchus cinerascens* (Ontario, California). The specimens from the two last-named bird species, Flycatchers, show a common variation from the type specimens in a greater length, less angulated posterior margin of metathorax, and paler markings. Taken previously by Kellogg from eight species of passerine birds.

**Nirmus fœdus** n. sp. (Plate VI, fig. 7).

Specimens from the Ash-throated Flycatcher, *Myiarchus cinerascens* (Ontario, California), the Long-tailed Chat, *Icteria virens longicauda* (Ontario, California), Say's Phoebe, *Sayornis saya* (Ontario, California), the Arkansas King-bird, *Tyrannus verticalis* (Ontario, California), the California Shrike, *Lanius ludovicianus gambeli* (Ontario, California) and the Phainopepla, *Phainopepla nitens* (Ontario, California). This species belongs to Piaget's second group of *circumfasciati*, and resembles *platyclypeatus* P. and *frater* (Les Pediculines, p. 145, pl. xii, figs. 1 and 2) from *Motacilla alba* and *Lamprotornis amethystina*, respectively.

Description of the female. Body, length 2.21 mm., width .75 mm.; abdomen broad for *Nirmus*, pale fuscous, head darker than the thorax or abdomen, narrow dark lateral borders on the head and thorax, but no dark lateral abdominal bands; pale brown median, transverse abdominal blotches.

Head, length .56 mm., width .43 mm.; clypeal front varying from narrowly to broadly parabolic, with four short hairs on the margin, a short marginal prickle before the trabeculæ, and two long dorsal hairs

arising before the trabeculæ, which are small, yet distinct; antennæ short, segment 2 longer than the other segments, segment 5 longer than segments 3 or 4, a few short hairs on the segments; eye distinct, with one very long hair and a short prickle at its posterior angle; temples rounded, with two long marginal hairs and two or three short prickles; occipital margin straight; head of a general dark fulvous, clypeal front paler, clearer yellow brown; antennal bands very narrow, blackish brown, strictly marginal and not extending far anteriorly; antennæ an even, pale fuscous; ocular blotches dark and extending angularly inward; temples with a narrow border of blackish brown.

Prothorax with sides rounding and slightly divergent, with a long hair in the posterior angle; three short dorsal spines near the anterior angle, two near the median line, and one nearer the lateral margin; lateral margins with irregular dark borders; intercoxal lines showing through from the under side distinctly, as sharply defined lines, directed in towards the median line, before the posterior margin. Metathorax but little wider than the prothorax, slightly constricted near the anterior angles; posterior angles broadly rounded, with one short hair and one spine; posterior margins nearly straight on the abdomen, except for the acute median angle; a series of long pustulated hairs on the posterior margin each side of the acute angle. Legs pale fuscous without definite markings.

Abdomen broadly elliptical; angles of segments not projecting, a series of long hairs on the posterior margin of the segments; transverse bands an even, pale fuscous, indistinct to wanting, without darker lateral bands; last segment broadly rounding, with slight emargination, two or three short marginal hairs and

several long dorsal hairs; ventral surface with broad median transverse bands of dark fuscous; blotches of the last segment posteriorly emarginate and laterally interrupted by the pustulations of two long hairs; these ventral blotches show through above.

**Nirmus ductilis** n. sp. (Plate VI, fig. 8).

One female from a Western Flycatcher, *Empidonax difficilis* (Ontario, California). A member of the group *interrupto-fasciati*, but well distinguished by its sharp, distinct, blackish marginal markings, without trace of median abdominal blotches.

Description of the female. Body, length 1.9 mm., width .4 mm.; long, slender, transparent white, with narrow, distinct, blackish lateral margins of head and abdomen.

Head, length .37 mm., width .28 mm.; elongate, conical, front narrow and slightly concave; a few short hairs along the margin of the front, the longest hair in front of the trabeculæ, which are small but distinct and uncolored; antennæ with second segment longest, segment 5 longer than segments 3 or 4, segments 1 and 2 pale transparent whitish, segment 3 with a slight shade of brown, segments 4 and 5 dark brown; eye with a prickle; temporal margins with one long hair and two or three prickles; occipital margin slightly convex; antennal bands narrow, blackish brown, fading out along the inner margins and anteriorly, before reaching the uncolored frontal margin, the posterior extremities bending angularly in, meeting the dark ocular blotches which in turn meet the dark brown marginal borders of the temples.

Prothorax with flatly rounding lateral margins and posterior angles, dark blackish brown lateral borders, which bend in and back on the anterior and posterior

extremities, the posterior borders almost meeting on the median line. Metathorax as wide as the head, sides diverging strongly; posterior angles with three or four long hairs, a series of pustulated hairs along the outer third of the posterior margin that is rounded upon the abdomen; dark, interrupted lateral blotches narrow and marginal on the anterior angles, and large, irregular submarginal blotches, darker near the posterior angles, growing paler near the middle. Sternal markings consisting of distinct intercoxal lines and a pale brown median blotch on the metasternum. Legs translucent whitish with blackish brown marginal bands and semi-annulations.

Abdomen very long, elliptical, with subparallel sides not tapering posteriorly until after segment 7; posterior angles of the segments slightly projecting, each bearing one weak hair, till segment 7, which has two hairs in the angle; segment 8 has one lateral marginal hair besides two hairs in the posterior angle; segment 9 broadly rounding, with angular emarginations, two short hairs on the posterior margin; two dorsal hairs arising near the posterior angle of each segment except segment 8 which has a series of posterior marginal hairs; pale translucent whitish with distinct, narrow blackish brown linear bands on the lateral margins of segments 1 to 7; segment 8 with small pale brown blotches near the lateral margin and one pale brown blotch on the median line; last segment uncolored; genital blotches pale brown, linear each side of the median line on the posterior margin of segment 7, also a pale brown blotch on the median line of segment 6.

**Nirmus lautiusculus** n. sp. (Plate VI, fig. 9).

A single male from a Bell's Sparrow, *Amphispiza belli* (Ontario, California). The new species, strikingly

marked, is a member of the group *interrupto-fasciati*, in general shape like *vulgatus* K. (New Mallophaga II, p. 496, pl. lxvii, fig. 5) and with the characteristic angulated, colored internal border of the antennal fossa. In the distinctness and contrast of the markings it recalls *illustris* K. (New Mallophaga II, p. 494, pl. lxvii, fig. 4).

Description of the male. Body, length 1.65 mm., width .4 mm.; translucent whitish with sharp, black, narrow marginal bands on head and abdomen; legs with annulations and semiannulations; thorax with intercoxal lines showing through distinctly, and abdomen with median linear brown transverse blotches, two to a segment, on ventral aspect.

Head, length .34 mm., width .31 mm.; front narrow, slightly convex; two or three short hairs on the lateral margin of the front; a short prickle in front of the trabeculæ which are distinctly angular and uncolored; antennæ long; segment 2 longer than other segments, segment 5 distinctly dark brown; eye prominent, with two prickles, one on the eye itself and a second just at its posterior angle; temples rounding, with one very long hair, one short fine hair, and three short prickles; occipital margin straight and bare; antennal bands narrow, clearly defined, not fading inwardly, their anterior extremities separated by the uncolored clypeal front, interrupted just before the trabeculæ by a distinct uncolored space, posterior extremities acutely meeting the dark narrow bands that angularly margin the antennary fossæ and the eye; the temples irregularly dark on the margins; the occipital signature distinctly showing through as a narrow brown blotch on the occipital margin and in front as a triangular blotch.

Prothorax with rounding lateral margins and posterior angles; three short spines on the dorsal surface

in each anterior angle; a dark blackish brown blotch in the anterior angles, and a narrow black band along the posterior margin, widening as it reaches the angle. Metathorax longer than the prothorax, with sides diverging; a series of six long hairs on the posterior margin which is narrowly rounded upon the abdomen; anterior angles with a small blotch of dark brown. Sternal markings showing through distinctly, the intercoxal lines of the metasternum appearing as a dark transverse band across the metathorax, the lateral extremities not reaching the margin but bending irregularly backward, abruptly stopping before they reach the posterior angle. Legs translucent with dark annulations and semiannulations.

Abdomen narrowly elongate, segments 1-7 with narrow, sharply defined black lateral bands; last segment uncolored, narrowly rounding, with several long dorsal hairs; the ventral surface of segments 1-6 with two median, linear brown transverse blotches on each segment; these blotches are united on segment 6 by a brown median line; segment 7 with two longitudinal brown blotches each side of the median line approaching each other anteriorly; two very small brown blotches on the last segment near the anterior angle.

**Nirmus longus** Kellogg.

New Mallophaga, II, 1896, p. 490, pl. lxxvii, fig. 1.

A single male from the Barn Swallow, *Chelidon erythrogastra* (Palo Alto ? California). This specimen differs distinctly from the type specimens in having but three instead of six lateral metathoracic hairs, in the more elongate head, and in the distinctness of the median uncolored longitudinal line of the abdomen. It should be distinguished by a varietal name.



Var. *domesticus* Kellogg and Chapman; one male from the Barn Swallow, *Chelidon erythrogastra* (California); body, length 1.54 mm., width .41 mm.; head, length .37 mm., width .31 mm.; thus being of about same size as the species type, and twice as long as Nitzsch's *gracilis*, the common *Nirmus* of the European swallows. Characters of species with differences as noted above. Osborn (Insects Affecting Domestic Animals, 1896, p. 225) refers a specimen from the Purple Martin, *Progne subis* (Ames, Iowa), to *gracilis*. He does not give the measurements of his specimen.

### **Nirmus brachythorax** Giebel.

Insecta Epizoa, 1874, p. 134.

*Nirmus brachythorax* G., Piaget, Les Pediculines, 1880, p. 150, pl. xii, fig. 8; Osborn, Insects Affecting Domestic Animals, Bull. 5, N. S., Div. of Ent., U. S. Dept. Ag., 1896, p. 223.

Specimens from two Cedar Waxwings, *Ampelis cedrorum* (Palo Alto, California). Osborn's specimens were from same host (Ames, Iowa). Giebel's types are from same host.

### **Lipeurus.**

#### **Lipeurus laculatus** n. sp. (Plate VII, fig. 1).

Four specimens collected of this strikingly marked *Lipeurus*; an adult male and an immature individual from a Pomarine Jaeger, *Stercorarius pomarinus*, and an adult male and an immature from a Pink-footed Shearwater, *Puffinus creatopus* (Bay of Monterey, Calif.) We believe that the specimens from the Shearwaters are stragglers from the Jaeger. (We have examined so many Shearwaters that, were the species a regular parasite of *Puffinus*, we should have taken other examples.) One other individual of *Stercorarius pomarinus* was

examined, but no *Lipeurus* was found on it. The new species shows no special resemblances to any of the described *Lipeuri* of allied hosts.

Female. Body, length 4.06 mm., width .78 mm.; slender, transparent whitish with distinct black marginal markings on the head, thorax, legs, and abdomen, broad transverse bands of dark chestnut showing through the dorsal surface of the abdomen.

Head, length 1. mm., width .59 mm.; elongate, conical, sides nearly parallel, clypeal front rather narrowly rounded, with five marginal hairs, four of which arise from the anterior part of the clypeus, being about equidistant, the fifth hair is in front of the very small trabeculæ; two dorsolateral hairs, one near the first anterior marginal hair and the other between the third and fourth marginal hairs; antennæ with segment 2 longer than the other segments, segments 1, 2 and 3 uncolored, segment 4 dark brown, segment 5 lighter brown; eye distinct, with a short prickle; temporal margins nearly parallel, with one hair and four short prickles; anterior margin of the clypeus uncolored; a wide, distinct signature with convex, posterior margin; color even chestnut-brown; antennal bands broad, black, sharply defined, except at the anterior portion where they extend indistinctly toward the median line of the head; temporal margin distinctly bordered with black, narrowing posteriorly; occipital blotches black and angular.

Prothorax quadrangular, sides parallel; a short prickle in the posterior angles; pale transparent brown, with broad black lateral borders following the margins of the anterior and posterior angles. Metathorax longer than broad, widest at the posterior angles; posterior margin straight; ground color slightly darker brown

than the prothorax, with irregular, black marginal bands fading just back of the anterior angles, and with an emargination at their posterior extremity where four long pustulated hairs and one short hair arise; one short hair on the posterior angle. Legs concolorous with the pale color of the prothorax, with black annulations and marginal bands; front legs short, femora wide, with small black marginal markings; second and third pair of legs long; coxæ produced and widely separated, with dark dorsal annulations; femora long and slender, with narrow black marginal markings; tarsi and claws pale brown; several scattered hairs and spines on the legs. Sternal markings composed of intercoxal lines between pro- and mesolegs, and a large suboblong, metathoracic, median blotch with rounded angles.

Abdomen with sides of segments 1-7 parallel; segments 8 and 9 suddenly narrowed and very small; posterior angles of the segments with from one to four long hairs; segment 9 narrowly emarginate, with two long hairs on each of the posterior angles; ground color transparent whitish, with black lateral marginal bands which extend inward along the anterior and posterior margins; these lateral bands are inwardly emarginated by an uncolored space surrounding the stigmata; on the ventral aspect fulvous transverse bands, concave posteriorly; segment 7 with two longitudinal, lateral fulvous blotches; segment 8 with irregular black marginal bands; segment 9 wholly dark brown to black.

### **Lipeurus diversus** Kellogg.

New Mallophaga I, 1896, p. 123, pl. viii, figs. 3 and 4.

Many specimens from thirteen out of thirty-four individuals shot of the Black-vented Shearwater, *Puffinus*

*opisthomelas*, from twelve out of fourteen individuals shot of the Dark-bodied Shearwater, *P. griseus*, from five out of six individuals shot of the Pink-footed Shearwater, *P. creatopus*, from a single specimen shot of *P. bulleri*, from a single specimen shot of *P. tenuirostris*, and a single specimen, probably straggler, from a Short-tailed Albatross, *Diomedea albatrus* (all the birds from the Bay of Monterey, California). The species was described from *Puffinus opisthomelas* (same locality).

This species and *Lipeurus angusticeps* Piaget (Les Pediculines, p. 306, pl. xxv, fig. 4) from *Thalassidroma leachi*, and *Lipeurus abnormis* Piaget (Supplement, p. 65, pl. vii, fig. 2) from *Puffinus major*, are closely related. There is a regular sequence in size from *angusticeps* through *diversus* to *abnormis*. It may be suspected that we have to do with one species of great variation in size; but the diagnostic characters of the three species are sufficiently important to justify the separation of the forms.

### **Lipeurus densus** Kellogg.

New Mallophaga II, 1896, p. 114, pl. vii, figs. 1 and 2.

Two females and a male from a Short-tailed Albatross, *Diomedea albatrus* (Bay of Monterey, California). Types taken from *Diomedea albatrus* and *D. nigripes* (see Kellogg, Mallophaga from Birds of Panama, Baja California and Alaska, in New Mallophaga III, p. 28, pl. iii, fig. 2). These specimens fully confirm the specific identity of the female described in New Mallophaga II, p. 114, and the male described in New Mallophaga, III, p. 28. The females now taken are almost, if not quite, as large as the male, and they are also quite as fully blotched and colored.

**Lipeurus ferox** Giebel. (See Kellogg, New Mallophaga, I, 1896, p. 127, pl. ix, figs. 1 and 2).

One male from the Short-tailed Albatross, *Diomedea albatrus* (Bay of Monterey, California). Previously taken by Kellogg from same host species (same locality). The description and figure which Taschenberg (Die Mallophagen, 1882, p. 145, pl. v, fig. 1 a) gives for the female of *Lipeurus ferox* apply in reality, we believe, to the male of *Lipeurus densus* Kellogg (See Mallophaga from Birds of Panama, Baja California and Alaska, in New Mallophaga, III, 1899, p. 28, pl. iii, fig. 2).

**Lipeurus concinnus** n. sp. (Plate VII, fig. 2).

A male and a female from the Short-tailed Albatross, *Diomedea albatrus* (Bay of Monterey, California). A slender, graceful form of the *clypeati sutura indistincta*, not much resembling any of the *Lipeuri* hitherto taken on the Albatross.

Description of the male. Body, length 3. mm., width .53 mm.; slender, pale, with distinct black marginal markings, and brown head and transverse abdominal blotches.

Head, length .65 mm., width .4 mm.; elongate, conical, front rounded, four long marginal hairs and one short one before the antennal angle; a long hair, arising from the dorsal surface between the first and second marginal hairs, extends beyond the margin; antennæ with segment 1 nearly as long as all the other segments, segment 2 about one-third as long as segment 1, segment 3 short, with a dorsal, angular, distal appendage, segment 5 longer than segment 4, segments 4 and 5 and the tip of the appendage of segment 3 light brown, antennæ elsewhere uncolored; eyes distinct but not

protruding; temples convex, hind-head widest about half way between the eyes and the posterior angles; margin with no long hairs, but with a short curving hair and a few prickles; occipital margin straight; head all brown, except small, nearly uncolored part of clypeal front, and antennæ, of which the first three segments are uncolored, last two pale brown; narrow marginal antennal bands; small signature, widest anteriorly and extending posteriorly in a fading, acuminate point; indistinct occipital bands and temporal borders blackish; anterior horns of the prothorax showing through, producing the effect of black triangular blotches at the base of the occipital bands.

Prothorax quadrangular, straight in the middle third on the metathorax; one very short hair in the posterior angle; general color transparent whitish, with distinct, even black lateral borders. Metathorax with lateral margins slightly convex before the middle; longer than broad; posterior margin slightly angulated upon the abdomen; three long hairs and two shorter hairs in the posterior angles; general color pale transparent brownish, with irregular lateral bands of black, expanding near the anterior angles into conspicuous triangular blotches, narrower below these blotches than the lateral bands of the prothorax. Legs long, slender, transparent, with black bands on femora and tibiæ; tibiæ and tarsi brown, a few scattered hairs on the legs. Prosternum with curving intercoxal lines; a medial, metathoracic, sternal blotch oblong, darker on the posterior half.

Abdomen slender, elongate, slightly widening to segment 4, then tapering gradually to segment 9; segment 2 longer than the other segments, while segments 4 and 5 are narrow, especially in the middle; posterior angles

but slightly extending, with from one to four hairs; segment 8 with six long posterior marginal hairs; general ground color of the abdomen, after segment 1, which is transparent whitish, dark brown; lateral markings black, of segment 1 they are anterior and angular, of segments 2 to 7 broadly extending towards the median line on the anterior half of the segments, while the posterior portion is darker and more definitely angular, this lateral band is deeply emarginated interiorly by a light brown blotch; the broad transverse bands are darker on the anterior margin, and the posterior margins of these transverse bands are emarginated by a pale brown band; segment 8 an even brown with very narrow dark lateral bands; segment 9 very small, rounding, of an even brown, with two long and two short hairs on the posterior margin.

Female. Body, length 3.63 mm., width .68 mm.; head, length .68 mm., width .43 mm.; first and second segments of antennæ nearly equal and as long as the other three segments, segment 5 longer than segment 4, segments 4 and 5 slightly colored with brown; eyes larger and more prominent than in the male; segments of the abdomen more nearly equal than in the male; segments 8 and 9 suddenly narrower than segment 7; segment 8 with a strong conspicuous hair in each anterior angle; six hairs along the posterior margin and eight small hairs in a transverse curving line on the ventral aspect; segment 9 with one hair in each anterior angle and two strong hairs on each of the two obtuse points, separated by the angular emargination of the posterior margin. Abdominal markings limited to dark brown to black, lateral blotches with pale, indistinct stigmatal spots; segments 7 to 9 almost wholly brown, with a narrow, distinct, uncolored median line; lateral parts of segment 7 blackish brown.

**Lipeurus testaceus** Taschenberg. (See Kellogg, New Mallophaga, I, 1896, p. 130, pl. xi, figs. 2 and 4).

A few specimens, rarely more than one or two from a bird, from eight out of thirty-four individuals shot of the Black-vented Shearwater, *Puffinus opisthomelas*; not found on any one of fourteen individuals shot of *P. griseus*; found on one out of six individuals shot of *P. creatopus*; and not found on the single specimen examined of *P. bulleri*, nor of *P. tenuirostris*, all from the Bay of Monterey, Calif. Taken previously by Kellogg from *Puffinus opisthomelas*, same locality. We have no males among the few specimens collected.

**Lipeurus limitatus** Kellogg.

New Mallophaga, I, 1896, p. 124, pl. viii, figs. 5 and 6.

Many specimens from five out of thirty-four individuals shot of the Black-vented Shearwater, *Puffinus opisthomelas*; from five out of fourteen individuals shot of *P. griseus*; from none out of six individuals shot of *P. creatopus*; from a single individual shot of *P. bulleri*, and from a single individual shot of *P. tenuirostris*, all from the Bay of Monterey, California. Described from three females from *P. griseus*, same locality. We are unable to find any males among our rather many specimens.

**Lipeurus fuliginosus** Taschenberg. (Plate VII, fig. 3).

Die Mallophagen, 1882, p. 156, pl. iv, fig. 3.

Numerous examples from the Shearwaters, *Puffinus opisthomelas* and *creatopus* (Bay of Monterey, California). Taken from eight out of thirty-four birds shot of *opisthomelas*, from one out of six birds shot of *creatopus*, and not found on any one of fourteen birds shot of *griseus*. The American specimens differ from the types



of *fuliginosus*, which were collected from *Diomedea eru-lans* and *chlororhyncha* by being larger, by showing no difference in the clypeal front of male and female, by having no short hair in the eye, and in other minor characters. We make a variety, therefore, for them.

Var. *major* Kellogg and Chapman. (Plate VII, fig. 3). In the following table of dimensions the figures enclosed in parentheses are the measurements given by Taschenberg for the type specimens. Male. Body, length 3.75 mm. (3.32 mm.), width .9 mm. (.58 mm.); head, length 1. mm. (.89 mm.), width .66 mm. (.55 mm.) Female. Body, length 3.9 mm. (3.72 mm.), width .94 mm. (.66 mm.); head, 1.05 mm. (.9 mm.), width .7 mm. (.59 mm.). From these measurements the head of the variety is proportionately wider than in the type forms. The species is recognizable by its dark color and the characteristic double set of internal bands in the forehead.

***Lipeurus farallonii*** Kellogg. (Plate VII, fig. 4).

New Mallophaga, I, 1896, p. 103, pl. v, fig. 4.

Many specimens from two individuals of Brandt's Cormorant, *Phalacrocorax penicillatus* (Bay of Monterey, California). Described (as a *Nirmus*) from a single female from a Farallon Cormorant, *Phalacrocorax dilophus albociliatus* (Bay of Monterey, California). The finding of the males of this species shows that it is a *Lipeurus* of the group *clypeati sutura distincta* and allied to Piaget's *setosus*, *sub-setosus*, et al. taken from various cormorants. The marked difference in size, outline and marking of the two sexes is striking, and likely to be confusing to students who may happen to meet but one sex. Is it possible that Piaget's *Nirmus dispar*, which the female of *farallonii* resembles, can be the female of some one of these *Lipeuri* of the cormorants?

Description of the male. Body, length 1.72 mm., width .36 mm.; head, length .43 mm., width .37 mm.; head like female, perhaps a little narrower, comparatively, behind; antennæ with segments 1 and 2 rather large, subequal, segments 3 and 4 very small, subequal, and segment 5 as long as 3 and 4 together, no distinct appendage; metathorax with sides nearly parallel, not plainly divergent as in female; abdomen slender, sides subparallel, ground color pale golden with wide whitish transverse sutural bands and prominent brown, shining subcircular lateral blotches not touching the narrow, inconspicuous blackish lateral bands; last segment truncate behind, with a group of four prominent hairs on each lateral half of the margin.

**Lipeurus forficulatus** Nitzsch. (See Kellogg, *New Mallophaga*, I, 1896, p. 129, pl. ix, figs. 3, 4, 5 and 6).

Specimens from a Californian Brown Pelican, *Pelecanus californicus* (Bay of Monterey, California). Taken previously by Kellogg from same host species, same locality; and from the White Pelican, *P. erythrorhynchus* (Lawrence, Kansas.)

**Lipeurus squalidus** Nitzsch. (See Kellogg, *New Mallophaga*, I, 1896, p. 132, pl. x, figs. 6 and 7.)

Six specimens from a Shoveller, *Spatula clypeata* (Palo Alto, California). These specimens resemble very much those specimens which Kellogg collected from *Merganser serrator* (see *New Mallophaga*, I, p. 130, pl. x, fig. 1). In fact, we fail to make out any good distinction between the species *temporalis* Nitzsch (found on the Mergansers) and the species *squalidus* of *Anas* and allied ducks.

**Lipeurus docophoroides** Piaget. (See Kellogg, New Mallophaga, II, 1896, pl. lxxviii, fig. 8).

Two female specimens from a Plumed Partridge, *Oreortyx pictus plumiferus* (El Dorado county, California). These specimens differ distinctly in the less pointed front from *L. docophoroides* taken by Kellogg from *Callipepla californica*, and in this form a link between *docophoroides* and *dissimilis* Piaget (see Kellogg, New Mallophaga, II, 1896, p. 507, pl. lxxviii, fig. 7). We have given these specimens a varietal name.

Var. *californicus* Kellogg and Chapman, from the Plumed Partridge, *Oreortyx pictus plumiferus* (El Dorado county, California); clypeal front not so pointed as in the species type, but approaching the rounded front of *dissimilis* P.; without signature; all the antennal segments colored, at least slightly, instead of only the last three as in the species type; the pustulated hairs of the body very long (longer than in the typical species forms).

**Lipeurus perplexus** n. sp. (Plate VII, fig. 5).

Two females from a Columbian Sharp-tailed Grouse, *Pediocetes phasianellus columbianus* (Pullman, Washington), and many females, differing slightly in shape of metathorax and abdomen, from a Sooty Grouse, *Den- dragapus obscurus fuliginosus* (Kings River Cañon, California). A peculiar broad, robust form of the group *circumfasciati*, with rounded front. Resembling Piaget's *L. opimus* (Supplement, p. 78, pl. viii, fig. 6) from *Turacus giganteus* (Museum of Leyden). Resembling also in general outline and characters Osborn's *Nirmus cordatus*, a specimen of which we have taken from *Limosa hamastica*. Perhaps both of these forms should be referred to the same genus. Piaget's *L. opimus*

should accompany them. Unfortunately, all of these species are represented by females only.

Description of female. Body, length 2.06 mm., width .59 mm.; short, broadly elliptical body, with short, broad head, broadly rounded in front; clear fulvous with pale golden brown lateral, transverse abdominal blotches.

Head, length .53 mm.; width .5 mm.; cordate, clypeal front broadly rounded, four short marginal hairs on the front, a short hair on the margin in front of the antennæ which are short; segment 2 of the antennæ longer than segment 1, segment 5 longer than segments 3 or 4; the anterior end of segment 3 and segments 4 and 5 pale fulvous, a few short hairs on the segments; eye prominent, a long hair rising from its dorsal surface, and with a conspicuous black fleck; temples convex, with two long hairs and two or three short prickles; occipital margin slightly concave; antennal bands slightly darker on the posterior tips and continuous as a narrow, even marginal border of pale translucent golden brown on the front; narrow, occipital blotch of pale golden brown, also a temporal border and an occipital band of the same color; mandibles dark chestnut-brown, showing through the head.

Prothorax short, lateral margins convex; one hair in the posterior angle; pale fulvous, slightly darker on the lateral margins. Metathorax with sides diverging, posterior angles rounding, with a long hair and short prickle; four hairs on the posterior margin in groups of two in small, uncolored pustulations; posterior margin with a slight angle on the abdomen; pale fulvous, slightly darker on the posterior angle; all of the thorax with a more whitish ground color than the head. Sternal markings consisting of pale intercoxal lines and a

very pale median metathoracic blotch. Legs pale fulvous with narrow dark marginal borders.

Abdomen elongate-ovate, tapering rapidly posteriorly; segments with their posterior angles slightly produced, each with from one to three hairs; a transverse series of a few long dorsal hairs near the middle of the segments; ground color pale fulvous, narrow translucent brown bands on the lateral margins; broad transverse pale brown blotches on segments 2 to 7, darker on their inner ends, separated by a broad pale median line, also a broad pale band on the posterior margin of each segment; segment 8 entirely colored, with slight median emarginations on the anterior and posterior margins of the blotch; no distinct lateral bands; last segment round, narrowly emarginate, with one short hair on the posterior margin of each rounding angle; two transverse blotches, one on each side of the emargination.

### Giebelia.

#### *Giebelia mirabilis* Kellogg.

New Mallophaga, I, 1896, p. 138, pl. xi, figs. 7 and 8.

Many specimens from twenty-seven out of thirty-four individuals shot of the Black-vented Shearwater, *Puffinus opisthomelas*; from ten out of fourteen individuals shot of the Dark-bodied Shearwater, *P. griseus*; from all out of six individuals shot of the Pink-footed Shearwater, *P. creatopus*; from a single individual shot of *P. bulleri*, and from a single individual shot of *P. tenuirostris*, all from the Bay of Monterey, California. Four specimens, probably stragglers from a Short-tailed Albatross, *Diomedea albatrus* (Bay of Monterey, California. The species was described from *P. opisthomelas*.

## Oncophorus.

**Oncophorus bisetosus** Piaget. (Plate VII, fig. 6).

Les Pediculines, 1880, p. 217, pl. xviii, fig. 4.

Several specimens from the Californian Clapper Rail, *Rallus obsoletus* and the Virginia Rail, *Rallus virginianus* (Palo Alto, California). Piaget's specimens were taken from *Rallina plumbeiventris*, *R. tricolor* and *R. isabellina*. He also found specimens on a Yellow Rail, *Porzana noveboracensis* (from North America, in the Museum of Leyden). The specimens from this last bird are distinguished by the varietal name *porzanae*, being slightly larger than the type specimens and showing certain small differences in hairs and markings. Our specimens from *Rallus obsoletus* and *R. virginianus* agree with var. *porzanae* in departing in the matter of size and hairs of dorsal surface of abdominal segments from the type specimens, but go farther in differing and must be distinguished by a varietal name.

Var. *californicus* Kellogg and Chapman. (Plate VII, fig. 6). From the Californian Clapper Rail, *Rallus obsoletus* (Palo Alto, California) and the Virginia Rail *Rallus virginianus* (Palo Alto, California). (In the following list of measurements the figures in parentheses are those given by Piaget for the type specimens). Female. Body, length 1.72 mm. (1.35 mm.), width .5 mm. (.47 mm.); head, length .53 mm. (.47 mm.); width .4 mm. (.38 mm.); seven hairs on margin of forehead, of which two are longer and dorsal, instead of six with one dorsal as in the types; a prominent hair in the eye not mentioned in the description of the types; two median hairs on dorsal aspect of each abdominal segment, as in the variety *porzanae* Piaget, instead of four as in the species type. The female has large

quadrangular, transverse, lateral abdominal blotches separated by a narrow median uncolored line hardly apparent on segments 6-9; a strong uncolored transverse line between segments 7 and 8; lateral bands black, distinct, segmented. In the male the transverse abdominal blotches are continuous across the segments, with widely separating, uncolored, transverse sutures, especially on posterior half of abdomen.

**Oncophorus remotus** n. sp. (Plate VII, fig. 7).

A male and female from a Great Gray Owl, *Scotioptex cinerea* (Pullman, Washington). Not at all like *O. heteroceras* Piaget (Les Pediculines, p. 222, pl. xviii, fig. 8) from *Strix bubo*, which has the head varying markedly in the sexes; and not like *O. hexophthalmos* Nitzsch (described by Nitzsch as a *Lipeurus* and referred by Giebel to *Ornithobius*, and by Piaget to *Oncophorus*) from *Strix nyctea*.

Description of the male. Body, length 2.02 mm., width .93 mm.; short, broad; pale golden brown, with slightly darker bands on the head and thorax.

Head, length .65 mm., width .59 mm., subpentagonal, broadly rounding in front; clypeus slightly convex, two hairs on each side of the uncolored clypeal front, a third marginal hair in front of the suture; a long marginal hair and short prickle in front of the trabeculae which are long and acutely angular; antennae with its first segment as long as all the other segments taken together, third segment with slight but appreciable distal projection, a few short spines on the segments; eye with a distinct ocular fleck and a long hair; temples with sides nearly straight, two long hairs and two prickles on the margin; occipital margin straight, without hairs or prickles; general color of the head pale

golden brown; clypeal signature very pale brown but distinct, anterior margin slightly concave; antennal bands interrupted at the suture, darker chestnut-brown at the posterior extremities, which are turned almost at a right angle with the anterior half and lie half way between the mandibles and base of the antennæ; distinct, angularly contorted, inner bands paler than the antennal bands; occipital bands pale anteriorly, growing darker and more sharply defined near the occipital margin.

Prothorax quadrangular, with rounded posterior angles, with one long hair; sternal markings showing through as dark bands near the lateral margins, bending inwardly before the posterior margin, and separated by a distinct, uncolored median line. Metathorax with convex, divergent sides, a long slender hair and a prickle on the lateral margin, near the posterior angle, three long hairs in the posterior angle; a series of hairs along the rounding, posterior margin. Legs pale brown, with a few scattered spines.

Abdomen broadly elliptical, narrowing at both extremities; a few long hairs in the posterior angles of the segments; a transverse series of hairs on the posterior margins of the segments; segments 5, 6 and 7 narrowed in the middle; last segment narrowly rounding, pointed, with two long hairs on the posterior margin; ground color very pale golden brown; transverse lateral blotches indistinct, separated by a broad uncolored median space, except on segment 5, where the transverse band extends across the entire segment; segments 6, 7 and 8 with a broad median blotch of darker golden brown; segment 9 entirely brown; there are but slight indications of defined lateral marginal bands; genitalia distinct, dark golden brown, broad and complex.



Female. Body, length 2.5 mm., width .93 mm.; head, length .71 mm., width .75 mm. The shape of the head different, the temporal margins being distinctly convex; segments 1 and 2 of the antennæ as long as segments 3, 4 and 5, but segment 2 longer than segment 1. Abdomen widely elliptical, but distinctly more elongate and less narrowed posteriorly; very pale golden brown; last segment emarginate, with rounding lateral halves.

### Eurymetopus.

**Eurymetopus taurus** Nitzsch. (See Kellogg, New Mallophaga, I, 1896, p. 135, pl. xi, figs. 3, 4, 5 and 6).

Two females from two specimens of the Short-tailed Albatross, *Diomedea albatrus* (Bay of Monterey, California). Previously taken by Kellogg from same host species (same locality). A single immature specimen, probably a straggler, from a Black-vented Shearwater, *Puffinus opisthomelas* (Bay of Monterey, California).

### Goniodes.

**Goniodes mammillatus** Rudow. (See Kellogg, New Mallophaga, II, 1896, p. 509, pl. lxxix, fig. 2).

Two immature specimens from a Columbian Sharp-tailed Grouse, *Pediocetes phasianellus columbianus* (Pullman, Washington). Previously taken by Kellogg from *Callipepla californica* (California).

### Colpocephalum.

**Colpocephalum perplanum** n. sp. (Plate VII, fig. 8).

One specimen from a Tufted Puffin, *Lunda cirrhata* (Bay of Monterey, California). This form resembles

*C. latifasciatum* Piaget (Supplement, p. 130, pl. xiv, fig. 2), from *Rhynchops flavirostris*. The difference in size, number of hairs of the temples, and character of abdominal segments, together with the unrelated host leads us to make the specimen the type of a new species.

Description of female. Body, length 1.84 mm., width .67 mm.; golden brown, with ill-defined, median, transverse abdominal bands, and small dark brown marginal abdominal blotches; head and thorax with blackish markings.

Head, length .35 mm., width .54 mm.; broadly and flatly rounded in front, with numerous, rather long, and a few short, marginal hairs; one very long marginal hair just in front of the ocular emargination, and two shorter hairs directly on the angle; ocular emargination pronounced and acutely angled interiorly; eye prominent, emarginated, with a large ocular fleck; ocular fringe distinct; antennæ with last segment broad, extending beyond the head; temples with anterior angles rounding, posterior angles angularly meeting the occipital margin; three very long and some shorter hairs on the temporal margin; the occiput slightly concave, with four rather long marginal hairs; a narrow, curving, fuscous band running parallel with the clypeal margin, ending at the lateral extremities in a dark chestnut spot; distinct, black, irregular, ocular blotch; triangular bases of occipital bands blackish brown, connected by an even, occipital border, narrowing medially.

Prothorax broad, lateral angles acute, bearing one long hair and a short spine, sides converging posteriorly, with one long hair in the posterior angles; a series of long hairs on the posterior margin. Mesothorax separated from the metathorax by a distinct,

lateral constriction, the posterior margin being distinctly marked with a dark brown band that turns in at the anterior angles along the lateral margins. Metathorax with anterior angles extending beyond the posterior margin of the mesothorax; sides divergent, posterior angles with two long hairs and two short spines; posterior margin straight on the abdomen, with a series of long hairs. Legs robust, concolorous with the metathorax.

Abdomen long, ovate; segments equal, with one or two long hairs and spines in posterior angles, and one or two short spines on lateral margins of each segment; dorsal surface with a single transverse series of hairs along the posterior margin of each segment; the ventral surface with several series of weakly pustulated hairs on each segment; last segment flatly convex, with two dorsal hairs near the lateral margins; ground color pale fuscous, with unevenly colored lateral border of darker fuscous, paling on the outer margins and darkest in posterior angles of segments and along inner margin; a longitudinal, narrow, uncolored, submarginal line parallel with the lateral margin; ill defined, transverse bands slightly darker fuscous.

### **Colpocephalum funebre** Kellogg.

New Mallophaga, I, 1896, p. 147, pl. xii, fig. 7.

One specimen from *Larus heermanni* (Bay of Monterey, California). Described from specimens from *Larus glaucescens* (Bay of Monterey, California).

### **Colpocephalum pingue** Kellogg.

New Mallophaga, I, 1896, p. 144, pl. xii, fig. 5.

One specimen, male, from a Short-tailed Albatross, *Diomedea albatrus* (Bay of Monterey, California). Described from the same host species (same locality).

**Colpocephalum spinulosum** Piaget. (Plate VII, fig. 9).

Les Pediculines, 1880, p. 563, pl. xlvii, fig. 3.

Many specimens from eight out of fifteen individuals examined of the Sanderling, *Calidris arenaria* (Pacific Grove, California). The specimens agree in all essential details of outline and markings with Piaget's description, showing the characteristic, finely pustulated, dorsal surface of the male, with the single transverse series of long pustulated hairs on each segment in the male and the two series in the female. But there is a marked difference in size, the species type, being one-fourth larger than our specimens. Piaget's specimens were taken from *Limosa melanura* (Musuem of Leyden). The American specimens should be distinguished by a varietal name.

Var. *minor* Kellogg and Chapman. (Plate VII, fig. 9). In the following table of measurements the figures in brackets are the dimensions given by Piaget for his type specimens. Male. Body, length 1.72 mm. (2.1 mm.), width .5 mm. (.64 mm.); head, length .31 mm. (.38 mm), width .34 mm. (.5 mm). Female. Body, length 2.16 mm. (2.45 mm.), width .7 mm. (.86 mm.); head, length .37 mm. (.38 mm.), width .5 mm. (.5 mm.) From the Sanderling, *Calidris arenaria* (Pacific Grove, California.)

**Colpocephalum timidum** Kellogg.

New Mallophaga, I, 1896, p. 145, pl. xii, fig. 6.

One specimen from a Black-bellied Plover, *Squatarola squatarola* (Pacific Grove, California). Described from *Charadrius dominicus* (Lawrence, Kansas).

**Colpocephalum flavescens** Nitzsch. (See Kellogg, New Mallophaga, II, 1896, p. 525, pl. lxxi, fig. 4).

Specimens from the Golden Eagle, *Aquila chrysaetos* (Palo Alto, California) and from a Siberian Eagle, *Haliaeetus pelagicus* (brought alive from the Arctic Ocean to California). Taken previously by Kellogg from *Haliaeetus leucocephalus* and *Archibuteo lagopus sanctijohannis* (Kansas). Taken by Osborn from "Swallow-tailed Kite" (Ames, Iowa).

**Colpocephalum grandiculum** n. sp. (Plate VII, fig. 10).

One specimen from a California Towhee, *Pipilo fuscus crissalis* (Palo Alto, California). Also a single specimen, much smaller, (otherwise not indicating immaturity) from a Heerman's Song Sparrow, *Melospiza fasciata heermanni* (Palo Alto, California), which, because of the similarity in outline, characters of legs, and general markings, may be referred to the same species. The species resembles in general shape *C. fumidum* Kellogg (New Mallophaga, II, 1896, p. 523, pl. lxxi, fig. 5) from a California Bush-Tit, *Psaltriparus minimus californicus* (Palo Alto, California).

Description of female. Body, length 2.28 mm., width .81 mm.; head and thorax fulvous, abdomen dull fuscous; small ocular and occipital blotches, very narrow marginal, lateral, abdominal bands; temples produced angularly; a distinct V-shaped uncolored marking between the ocular emarginations, projecting backwards as a more or less distinct uncolored median line through the thorax and abdominal segments 1 to 6.

Head, length .5 mm., width .65 mm.; front broadly rounded, subsemicircular; several hairs on the strictly anterior margin, two rather long hairs on the lateral margin of the front, and two long hairs in front of the ocular emargination; eye distinct, almost if not quite

divided, the larger and anterior portion lying in the angle of the ocular emargination, while the smaller, posterior portion lies apparently on a ridge that extends back across the temples; temples prominent; anterior margin almost at right angles with the median line of the head; ocular fringe prominent, extending as far as the anterior temporal angle, a few short hairs on this angle, two long hairs and a few short spines on the lateral margins and the posterior rounding angles; occipital margin medially convex; head smoky, fulvous, distinct, with slightly darker bands extending towards the lateral margin from the base of the mandibles which are dark brown; a V-shaped uncolored marking, each branch extending from the slight swelling in front of the ocular emargination back two-thirds of the distance to the occipital margin, where the uncolored lines meet at the apex of the V; ocular blotches black, even, angular, extending forward as far as the uncolored branch of the V; temples very narrowly bordered with dark brown on the posterior angles; occipital blotches dark brown to black, sharply defined except on the anterior extremity, where they send out a sharp angular blotch; lateral extremities long and gradually narrowing, inner extremities blunt, separated by a fulvous median space.

Prothorax, lateral angles bluntly rounding, with one long hair and a short spine; lateral margin slightly concave, latero-posterior angles with no hair; posterior margin rounding on the mesothorax; two long hairs on the posterior margin near the lateral posterior angles; evenly fulvous, slightly darker on the lateral margins; chitin transverse and longitudinal bars distinct. Mesothorax with sides diverging, posterior angles slightly protruding, separated distinctly from the metathorax, a long hair on the lateral margin, a dark marginal band

on the anterior angles. Metathorax narrow, sides diverging, posterior angles rounding, posterior margin straight, with one long hair, one short hair, and a short spine; narrow dark brown marginal band on the anterior angle and lateral border; faint indications of an uncolored longitudinal median line. Legs robust; femora broad; fulvous with darker markings on the border; a series of short hairs on the outer margin of the tibia. Sternal markings consisting of intercoxal lines, a distinct shield-shaped median blotch on the prothorax, a narrow median darker longitudinal blotch between the pro- and mesothorax, a larger median blotch between the second and third pair of legs, with a distinct triangular anterior portion and a quadrangular posterior portion.

Abdomen broadly elongate; posterior angles projecting but little, with one long hair in each angle, and a series of dorsal hairs on the posterior margin of each segment; segments widely separated by uncolored sutures; transverse lateral blotches fuscous, darkening on the lateral margins into narrow bands; segments 1 to 5 with the transverse blotches separated by a narrow uncolored median line; segments 5 to 8 entirely dark fuscous; last segment with broadly rounding posterior margin, one long and one short hair each side and a series of short hairs on the posterior margin; color an even fuscous. Ventral surface a small median triangular fuscous blotch on segment 1; transverse blotches uninterrupted, but the posterior margin of the blotches on segments 2 to 6 emarginated, darker fuscous on the posterior margin; a double series of pustulated hairs and a few scattered hairs on each segment.

### Ancistrona.

**Ancistrona gigas** Piaget. (See Kellogg, *New Mallophaga*, I, 1896, p. 150, pl. xiii, figs. 1 and 2).

A few specimens from the Shearwaters, *Puffinus opisthomelas* and *P. griseus* (from one individual of *opisthomelas* out of thirty-four examined, and from two of *griseus* out of fourteen examined) from the Bay of Monterey, California. Taken previously by Kellogg from *Fulmarus glacialis* vars. *rodgersii* and *glupischa* (Bay of Monterey, California).

### Trinoton.

**Trinoton luridum** Nitzsch. (See Kellogg, *New Mallophaga*, I, 1896, p. 152, pl. xiii, fig. 4).

Specimens from the Baldpate, *Anas americana*, and the American Scaup Duck, *Aythya marila nearctica*, (Palo Alto, California) and from the Shoveller, *Spatula clypeata* (Mountain View, California). Taken previously by Kellogg from two of these hosts, and from other duck species (Kansas and California).

**Trinoton lituratum** Nitzsch. (See Kellogg, *New Mallophaga*, I, 1896, p. 151, pl. xiii, fig. 3).

Specimens from the Shoveller, *Spatula clypeata* (Mountain View, California) and from another individual of the same species (Palo Alto, California). Taken previously by Kellogg from *Dafila acuta* and *Merganser americanus* (Lawrence, Kansas).

### Menopon.

**Menopon tridens** Nitzsch. (See Kellogg, *New Mallophaga*, I, 1896, p. 165, pl. xv, figs. 3 and 4).



Specimens from an American Eared Grebe, *Colymbus nigricollis californicus* (Bay of Monterey, California); from the Western Grebe, *Aechmophorus occidentalis* (one bird from Washington, and one from California); and from the Californian Clapper Rail, *Rallus obsoletus* (three birds), and the Virginia Rail, *Rallus virginianus* (Palo Alto, California). Taken previously by Kellogg from the two hosts first named, and from *Urinator lumme* (California).

**Menopon infrequens** Kellogg.

New Mallophaga, I, 1896, p. 161, pl. xv, fig. 5.

Ten specimens from *Larus delewarensis* (Bay of Monterey, California). Described from a single female from *Larus glaucescens* (Bay of Monterey, California). The male is much smaller than the female, as shown by following measurements: body, length 1.4 mm., width .6 mm.; head, length .25 mm., width .53 mm.

**Menopon irrumpens** n. sp. (Plate VIII, fig. 1).

Four specimens from a Short-tailed Albatross, *Diomedea albatrus* (Bay of Monterey, California). No *Menopon* has been hitherto taken from an Albatross.

Description of female. Body, length 2.23 mm.; width 1.01 mm.; short, broad; dark chestnut-brown with darker blotches on the head and lateral bands on thorax and abdomen.

Head, length .4 mm., width .74 mm.; wide through the temples; clypeus broad, with a slightly angulated front; one rather long and one shorter marginal hair each side of the angular point of the clypeus, a short prickle near the suture; three long marginal hairs on the slight swelling in front of the ocular emargination, two short hairs in front of these, nearer the suture;

ocular fringe distinct, composed of stiff curving hairs which extend slightly on the temporal margin; temples with posterior angles produced; four long pustulated hairs, two shorter hairs, and one short spine on the margin; occipital margin concave, with a series of six long pustulated hairs and one spine; color of the head light chestnut-brown, with dark brown ocular blotches and black ocular fleck, and dark chestnut markings in front, near the mandibles, which show through the head distinctly; occipital margin with a narrow chestnut band, darkening into broad occipital blotches.

Prothorax broad, sides rapidly converging posteriorly; lateral angles narrowly rounding, with a short spine and a long pustulated hair in the angle, a series of fourteen strong hairs along the convex posterior margin; general color dark chestnut-brown, except the space above the conspicuous dark transverse chitin bar, which is pale fuscous; the longitudinal bars, at the ends of the transverse bar, are narrow but distinct. Metathorax short, hardly broader than the prothorax; sides divergent, with two spines on the lateral margins; two long hairs and two short spines on the posterior angles; a series of long pustulated hairs on the posterior margin not so heavy, however, as those of the prothorax; color chiefly dark chestnut-brown, transverse band darkening into a narrow black line along the lateral margin, and into a broad triangle in the posterior angles; in front of this dark band, a pale, broad, mesosutural band, and in front of this the pale brown mesothorax. Legs of the palest fuscous of the prothorax, with several short, stiff hairs on the femora and tibia.

Abdomen broadly elliptical, with several short spines on the lateral margins of the segments, and from one to five long hairs in the posterior angles; a series of

long hairs on the posterior margin of each segment; transverse blotches of dark chestnut-brown continuous across the segments, with but a very narrow, pale, posterior marginal line; the lateral marginal bands are wide and distinctly darker brown, and they do not reach the posterior margins; the last segment broadly emarginate, with two long, dorsal hairs on the rounded, posterior angles, and two very short spines on the inner margin of the emargination; the ventral surface with dark transverse bands and a series of hairs along the posterior margin of each segment.

**Menopon paululum** n. sp. (Plate VIII, fig. 2).

Specimens from three out of thirty-four individuals shot of the Black-bodied Shearwater, *Puffinus opisthomelas*, from two out of fourteen shot of *Puffinus griseus*, and from two specimens out of six shot of *Puffinus creatopus*. The first *Menopon* species recorded from *Puffinus*. The new species shows no special resemblance to forms taken from allied birds, like Fulmars.

Description of the male. Body, length 1.13 mm., width .5 mm.; small, pale yellow with distinct brown ocular blotches; abdomen with golden transverse bands and brown marginal blotches.

Head, length .26 mm., width .38 mm.; front rounding, with four short hairs on the margin, one marginal hair at the suture, three long and one short hair in front of the ocular emargination which is distinct but shallow, with an ocular fringe; maxillary palpi long, last two segments extending beyond the margin of the head; eyes inconspicuous but with a distinct ocular fleck; temples but little expanded, with four long hairs and several short spines on the angles; occipital margin but slightly concave; head pale yellow with a brown

spot just outside the mandibles connected with them by a narrow brown band; mandibles dark, showing through the head; ocular blotches small, narrowing posteriorly; occipital margin with a narrow brown band and small occipital blotches.

Prothorax with anterior angles slightly produced, a short prickle and a long hair in the angle, a series of long hairs on the rounding posterior margin; transverse and longitudinal chitin bars pale yet distinct; no blotches. Metathorax with slight lateral emargination; posterior margin nearly straight, with a series of spiny hairs; a pale golden, narrow, mesothoracic, transverse band, and similarly colored, wider, metathoracic bands. Legs pale golden; femora thick. A median prosternal blotch, shield-shaped, with a lateral process projecting backward and outward; metasternum with a pale median blotch from which short spiny hairs arise.

Abdomen elliptical, with posterior angles of the segments slightly produced, a few short spines on the lateral margins, and one or two long hairs and short spines in the posterior angles; a series of stiff hairs along the posterior margin of the segments, those on the last segments being longer; on the ventral surface two transverse series of short spiny hairs on each segment; pale golden transverse bands extending across the segments to shiny brown subcircular marginal blotches; last segment rounding behind, without marginal blotches, and with a few longish hairs.

Female. Body, length 1.74 mm., width .67 mm.; head, length .27 mm., width .45 mm., thus being much longer than the male; transverse bands of the abdomen rather more distinct than in the male, the uncolored sutural bands being thus made also more distinct, each segment with posterior series of hairs; last segment

with six stiff hairs on each rounding angular portion of the posterior margin, and the median straight portion with an uncolored border and fringe of fine hairs.

**Menopon petulans** n. sp. (Plate VIII, fig. 3).

One specimen from a Black-bodied Shearwater, *Puffinus griseus* (Bay of Monterey, California). Shorter, broader, and darker colored than *paululum* n. sp. from *Puffinus opisthomelas* (same locality).

Description of male. Body, length 1.34 mm., width .68 mm.; short, broadly elliptical; head with distinct ocular emargination and projecting temples; general color dark fuscous with distinct, large black ocular blotches; transverse abdominal bands fading in their medial portions but distinct laterally.

Head, length .28 mm., width .53 mm.; front rounded, with a very slight median angulation; a rather long median hair each side of the front angulation; a short marginal prickle in front of the suture, one rather long marginal hair just back of the suture; two pustulated hairs and one long spine in front of a distinct ocular emargination; eye distinct, filling base of ocular emargination with a black ocular fleck; temples rounding, projecting, with three long hairs and several spines; occipital margin concave, with six long hairs and two spines on the margin; front of the head with slightly darker brown triangular blotches each side of the pale front; mandibles showing through the head as a dark brown spot; ocular blotch broad and distinctly black, fading gradually along the temporal margin; occipital bands faintly showing; occipital blotches distinct, being connected by a narrow black band which fades on the temporal margins.

Prothorax with lateral angles narrowly rounding, with one long hair and a short spine, a series of long hairs on the rounding posterior margin; lateral blotches but little darker on the margins; transverse chitin bar distinct, but little darker than the fuscous ground color of the prothorax. Metathorax short, lateral margins slightly divergent, a little concave, a short prickle near the posterior angles and a long hair and one short spine in the angle; a series of hairs along the weakly convex posterior margin; lateral blotches distinct, meeting on the median line; darker brown to black on the lateral margins, a pale band on the posterior margin. Legs, robust, pale fuscous with darker marginal markings. Sternal markings consisting of a distinct median blotch, with rounded anterior margins, posterior angles projecting backward, posterior margin also produced into a distinct angle.

Abdomen broadly elliptical, segments with short spines on the lateral margins and a few long hairs in the posterior angles; a series of dorsal, spiny hairs on the posterior margin of each segment; general color of the abdomen dark fuscous; lateral blotches distinct, black on the lateral margins, paler and fading out medially on the segments before segment 7; segments 7 and 8 with continuous transverse bands; segment 9 wide, with two lateral blotches meeting narrowly on the median line and a paler band on the lateral margin; the last segment flatly rounding; two short hairs on the posterior margin; ventral markings very similar to those of the dorsal surface, also a similar series of hairs on the posterior margins of the segments.

**Menopon titan** Piaget. (See Kellogg, New Mallophaga, I, 1896, p. 163, pl. xv, fig. 2).

One male from a Brandt's Cormorant, *Phalacrocorax penicillatus* (Bay of Monterey, California). This specimen differs from every other individual of this curious species that I have yet examined. It is smaller than var. *linearis*, the blotches of thorax are different, and the incomplete series of pustulated hairs along the posterior margins of the abdominal cross-bands conspicuously differ from the usual condition in *titan*. *Titan* has not before been taken from any other bird than a pelican, and this single individual from a cormorant may be a straggler. If so, it must have come from *Pelecanus californicus*, the only species of pelican found in the Bay of Monterey.

Var. *incompositum* Kellogg and Chapman. (Plate VIII, figs. 4 and 5). Male, body, length 4.6 mm., width 1.66 mm.; head, length .62 mm., width 1. mm.; the smallest variety of *titan* yet noted; mesothorax with a narrow transverse blackish band continuous across the segment; metathorax with triangular, blackish, lateral blotches, apex projecting inward; abdominal segments 1-8 with continuous, blackish, transversal bands, paler on segments 7 and 8; an incomplete series of pustules (six complete and prominent on segments 3-6) along posterior margin of each transverse band; last segment with a small transversal linear blotch on each side; genital blotch on underside of segment 8 composed of two lateral triangles partly overlapping a central shield, from which projects anteriorly a sharp, distinct, linear process; laterad of this central compound blotch there is on each side a weakly curving, blackish, diagonal, linear blotch. Found on Brandt's Cormorant, *Phalacrocorax penicillatus* (Bay of Monterey, California).

**Menopon titan** var. **linearis** Kellogg.

New Mallophaga, I, 1896, p. 163, pl. xv, fig. 2.

Many specimens from the Californian Brown Pelican, *Pelecanus californicus* (Bay of Monterey, California). Described from the same host species, same locality.

**Menopon funereum** n. sp. (Plate VIII, fig. 6).

A single male from a Gairdner's Woodpecker, *Dryobates pubescens gairdnerii* (Sunol, California), and a pale male from a Western Evening Grosbeak, *Coccothraustes vespertinus montanus* (California). This second specimen determined with doubt. Not like *M. pici* Denny. (Monograph. Anoplur. Brit., p. 219, pl. xx, fig. 5; Piaget, Supplement, p. 93, pl. x, fig. 3) from *Picus viridis*; also differing distinctly from *M. precursor* Kellogg (Mallophaga from Birds of Panama, Baja California, and Alaska, in New Mallophaga, III, 1899, p. 46, pl. iv, fig. 8) from *Melanerpes uropygialis* (Baja California).

Description of the male. Body, length 1.5 mm., width .59 mm.; mostly dark colored because of the strong, continuous, brown, transverse, abdominal bands and the blackish marking of the head, thorax and legs; thorax long, with mesothoracic sutural line distinct under magnification.

Head, length .4 mm., width .56 mm.; front convex, with two marginal hairs near the median line of the front, a short prickle midway between this hair and a long hair and short spine which are on the angle in front of a slight lateral concavity, in which are a long hair and short prickle; a long hair and shorter hair near the posterior angle of the concavity and in front of the angle before the ocular emargination on which are two long hairs; eye large, filling the inner angle of the ocular emargination, distinctly emarginate and



with a large black ocular fleck; a rather long hair on its dorsal surface near the margin; a distinct ocular fringe; temple meeting the ocular emargination angularly; fine, long, pustulated hairs and some short spines on the temporal margin; occipital margin concave, with two long hairs near the median line; ground color of the head pale fuscous with dark blackish brown blotches each side of the front; ocular blotches broad, distinct on the posterior margin but fading anteriorly till they color the angle in front of the ocular emargination; temples narrowly and irregularly bordered with dark brown; occipital margin with a defined blackish brown band, widening into angular occipital blotches; distinct occipital signature.

Prothorax short; anterior angles inconspicuous, with two spines; posterior margin with a series of long hairs; ground color dark fuscous, with distinct chitin bars. Mesothorax and metathorax long, being separated by a narrow, uncolored suture and slight lateral emargination, mesothorax dark on the anterior portion; metathorax with distinct dark chitin bars. Sternal markings consisting of dark intercoxal lines; prothorax with distinct median blotch of pale fuscous, a distinct V-shaped chitin bar longitudinally across it; dark median blotches on the meso- and metathorax. Legs large, pale fuscous with dark marginal borders and semiannulations; scattered hairs and spines.

Abdomen short, broadly elliptical, small as compared with the large head and thorax, which are together longer than the abdomen; a series of long hairs on the posterior margin of each segment and a few short spines and hairs in the posterior angles; each segment with a broad, dark, transverse band, darker on the lateral margin and covering almost all of the segment; a

longitudinal, submarginal, pale band, parallel with the lateral margins of the abdomen; last segment broadly rounded, with several long hairs near the lateral margin and some shorter hairs on the posterior portion of the segment; ventral surface with at least one series of short pustulated hairs on the posterior margin of each segment; genitalia distinct, angular, extending far forward in the body.

**Menopon distinctum** n. sp. (Plate VIII, fig. 7).

Specimens from two specimens of the Ash-throated Flycatcher, *Myiarchus cinerascens* (Palo Alto and Ontario, California), and from a Cactus Wren, *Heleodytes brunneicapillus* (Ontario, California). A well marked form.

Description of the female. Body, length 1.5 mm. width .62 mm., elongate-elliptical; pale translucent fuscous with blackish brown ocular blotches; black ocular fleck and small blackish spots on the lateral margins of the front; dark transverse blotches on the abdomen; a distinct pale submarginal longitudinal line parallel with the lateral margin of the abdomen.

Head, length .31 mm., width .46 mm.; parabolic, wide through the temples; front broadly rounding, a slight angulation in front; one hair each side of this angulation; two hairs on the lateral margin of the front; two long hairs on a slight swelling in front of a distinct ocular emargination; one long and two short hairs on the dorsal surface, in front of the ocular emargination; eye large, filling the angle of the emargination and extending on the temple, with a slight constriction; a short spine on the posterior portion, and a large black ocular fleck; ocular fringe made up of comparatively few stiff spines, more numerous on the outer

margin in front of the temples; two long hairs and several shorter hairs on the temporal margin; occipital margin nearly straight, with two long and two short hairs; pale translucent fuscous; mandibles dark, showing through the front; a dark spot on the lateral margin of the front outside the base of the mandibles; ocular blotches dark brown to black, extending forward as far as the dark lateral blotches, but paler chestnut-brown anteriorly; dark narrow border on the occiput, occipital bands pale yet distinct.

Prothorax with convex lateral margins; a short spine in the anterior angle; a few spines on the lateral margin; a series of long hairs on the rounding posterior margin; fulvous, with dark transverse and longitudinal chitin bars distinct. Mesothorax wide, with strongly divergent sides; a few spines on the lateral margin; one long hair and several spines in the posterior angle; dark inner chitin bars extending along the anterior angle and back across the segment; a second chitin bar extending from the lateral margin back across the metathorax; the posterior angle of the mesothorax dark fuscous, otherwise the segment is pale translucent fuscous. Metathorax narrow; a long hair and a short spine in the posterior angles; dark lateral triangular blotches, fading inwardly. Legs long, pale translucent fuscous, with dark fuscous borders and semiannulations; many short spines on the femora. Sternal markings consisting of distinct brown intercoxal lines and a pale but distinct wedge-shaped median blotch.

Abdomen broadly elliptical; several spines on the lateral margins of the segments; some long hairs in the posterior angles; many dorsal spines, not arranged in any definite series on the segments; lateral marginal blotches dark fuscous, separated from the median

transverse blotches by a pale submarginal band, parallel with the lateral margin of the abdomen; median transverse blotches paler fuscous; transverse bands of segments 1 to 6 widely separated by uncolored sutural bands; last segment rounding, with a fringe of hairs on the posterior margin, dark transverse blotch narrowed distinctly in the middle, ventral transverse bands distinctly fuscous; many hairs arranged nearly in two definite series in each segment.

Male. Body, length 1. mm., width .59 mm.; head, length .25 mm., width .5 mm.

**Menopon persignatum** n. sp. (Plate IX, fig. 1).

Many specimens from the California Jay, *Aphelocoma californica* (2 specimens, Mountain View, California). Resembling in general shape and characters the three or four species of *Menopon* described by Nitzsch and Piaget from the European Jays.

Description of the female. Body, length 2.03 mm., width .75 mm.; long, narrow; pale fuscous with distinct black ocular blotches, blackish lines in the thorax, and broad dark fuscous transverse abdominal bands.

Head, length .34 mm., width .56 mm.; front broadly but slightly angularly rounding; no hairs on the frontal margin, one long and two shorter hairs on the lateral margins of forehead, besides two long hairs just in front of the ocular emargination, which is nearly filled by the large eye which is slightly emarginated and bears a short prickle; ocular fringe with only a few hairs of uneven length; temples produced, rather narrowly rounded, with five long hairs and several short hairs and spines on the margin; occipital margin straight in its middle portion; one long and one short hair near

the posterior margin, and one hair on each side of the median line; ground color of the head fuscous with distinct, curving, linear blackish ocular blotches; an indistinct brown occipital signature with anterior angles produced laterally.

Prothorax large, lateral angles with one long hair and a short spine, two long hairs in the broadly rounded posterior angle and a series of six long hairs on the straight posterior margin. Mesothorax with four or five short spines on the lateral margin and two long hairs and two spines in the posterior angle; a series of stiff hairs along the posterior margin. Metathorax with a series of stiff hairs on its posterior margin, and in the posterior angle one long hair and two spines; ground color of the thorax is pale fuscous, no distinct blotches, but dark transverse and longitudinal chitin bars on the prothorax; curving chitin bars on the anterior angle of the mesothorax, and a pair of chitin bars extending from the anterior half of the lateral margin of the mesothorax back across the metathorax as far as the third pair of coxæ. Sternal markings consisting of dark intercoxal lines; on the prothorax a small median blotch with the posterior angles extended in dark chitin bars which extend forward to the anterior margin; the posterior margin of the blotch extends back in a narrow point; a large wedge-shaped blotch between the second and third pair of coxæ; this blotch has a series of short pustulated hairs on its anterior and lateral margins. Legs pale fuscous with narrow dark borders.

Abdomen elongate-elliptical; two long hairs and short spines in the posterior angles; a series of short hairs on the posterior margin of each segment, growing more stiff and spine-like near the lateral margin; broad dark

fuscous transverse bands separated by broad pale sutural bands; darkening laterally to form broad dark lateral bands, set off by rather broad pale submarginal, longitudinal bands; last segment flatly rounding, with a fringe of fine hairs; ventral surface with similar markings, but with an irregular median transverse series of hairs, besides the series on the posterior margin of the segment.

Male. Body, length 1.43 mm., width .75 mm.; head, length .28 mm., width .56 mm., thus being much smaller than the female; also of short, broad, oval shape rather than elongate and narrow; darker and more evenly fuscous; pale submarginal longitudinal bands parallel with the sides of the abdomen less distinct than in female; transverse bands narrow and less definite; lateral blotches narrow and darker on the posterior margin of the segments; last segment slightly angular, with a fringe of hairs; genitalia faintly distinguishable through the body, extending forward into segment 7.

**Menopon incertum** Kellogg.

New Mallophaga, II, 1896, p. 533, pl. lxxiii, fig. 2.

Many specimens from a Russet-backed Thrush, *Turdus ustulatus* (Palo Alto, California); a Western Lark Sparrow, *Chondestes grammacus strigatus* (Ontario, California); and a Vigor's Wren, *Thryothorus bewickii spilurus* (Palo Alto, California). Taken previously by Kellogg from *Turdus ustulatus* and from the American Goldfinch, *Spinus tristis* (same locality).

**Menopon mæstum** n. sp. (Plate IX, fig. 2). .

Two specimens from a Golden-crowned Sparrow, *Zonotrichia coronata* (Palo Alto, California), and a

Samuel's Song Sparrow, *Melospiza fasciata samuelis* (Palo Alto, California). A short, broad species, with short, wide head, and wide prothorax, approaching the *Eureum* type of Menopon (see p. 133 this paper).

Description. Body, length 1.37 mm.; width .81 mm.; short, broad; head very short and wide, not of the usual evenly crescentic type; occipital margin straight and dark; general color dark fuscous, the dark markings of the head making the posterior portion appear quadrangular.

Head, length .28 mm., width .59 mm.; front broad, flatly rounded; six hairs on the front, one each side of the angulation and three (one long and two shorter) hairs on the lateral margins of the front; two hairs on the angle in front of the ocular emargination; lateral margin of the forehead almost at right angles with the lateral margins of the front; eye large, prominent, with a large black ocular fleck and a short spine; ocular fringe sparsely spined; temples projecting strongly, and narrowly convex, with three long hairs and several shorter hairs and spines; occipital margin straight; a narrow broad submarginal band across the front, its posterior ends bending in so as to leave clear pale brown the anterior portion of the angle in front of the ocular emargination; from this angle a distinct dark fuscous quadrangular blotch extends back to the occipital margin, cutting off the rounding temples which are very pale fuscous; ocular blotches narrow and dark, extending forward along the ocular emargination, meeting the anterior margin of the dark fuscous blotch interrupting the arms of the narrow uncolored V-shaped marking, which has its branches rising from the inner angle of the ocular emargination and its vertex on the occipital margin; occipital blotches blackish

brown, connected by a narrow even line on the occipital margin; a dark broad occipital signature showing through the head.

Prothorax short and wide; two short spines in the anterior margin and a series of four long pustulated hairs and one short spine on each rounding lateral and posterior margin; transverse and longitudinal chitin bars distinct; median portion of the prothorax pale anteriorly, but darker fuscous towards the posterior margin; lateral portions, beyond the longitudinal chitin bars, dark fuscous. Mesothorax narrow; posterior angles distinctly angular, with a long hair and spine; dark transverse band on the posterior margin, dark longitudinal chitin bars extending from the anterior angles across the mesothorax; a second pair of chitin bars extending from the anterior, lateral margins back across the metathorax. Metathorax narrow, appearing like the first abdominal segment; a long hair and two spines in the posterior angle; a dark brown transverse band across the lateral margin. Sternal markings consisting of dark intercoxal lines, a median blotch on the prothorax, with the posterior angles produced laterally, meeting narrow dark chitin bars which extend forward to the anterior margin; the posterior margin of the blotch also produced in an angle; a broad brown median band between the second and third pair of legs, also extending onto the first abdominal segments; a few scattered pustulated hairs on this band. Legs large, pale fuscous, with narrow dark borders and scattered hairs.

Abdomen broadly ovate, the poles broadly truncate; posterior angles projecting, with one or two long hairs and a short spine; segments narrower on the anterior half of the abdomen; a few hairs on the posterior margin of the segments; entire abdomen a dark rich



fuscous, darker on the posterior margins of the segments; last segment broad, narrow, with a fringe of hairs along the rounding posterior margin.

**Menopon malleus** Nitzsch (Plate IX, fig. 3).

Germer's Mag. Ent., 1818, vol. iii, p. 301.

*Eureum malleus* Nitzsch, Burmeister, Handb. d. Ent., 1840, vol. ii, p. 441; Denny, Monograph. Anoplur. Brit., 1842, p. 288; Giebel, Insecta Epizoa, 1874, p. 249; Piaget, Les Pediculines, 1880, p. 608, Supplement, 1885, p. 139, pl. xv, fig. 3.

A single immature specimen from a Cliff Swallow, *Petrochelidon lunifrons* (Ontario, California), and an adult female and an immature specimen from a Cactus Wren, *Heleodytes brunneicapillus* (Ontario, California). The single specimen of this species previously known was collected by Nitzsch in 1814 from *Hirundo rustica*. As the above named Cliff Swallow and Cactus Wren were collected by the same person on the same day it may be that the two individuals taken from the wren are stragglers from the swallow.

This species has heretofore been attributed to the genus *Eureum* Nitzsch, the genus being based upon the single specimen (which, though heretofore apparently not so considered, is immature) of this species and a very few specimens of another very different species, *cimicoides* Nitzsch from the European Swift *Cypselus apus*. Piaget has suspected that both these species are merely rather aberrant members of the genus *Menopon*, which position, as regards the species *malleus*, at least, we take unqualifiedly. The two species have been held together partly through the usual conception of the near relationship of the hosts; as Nitzsch says, "*habitatio in chelidonum familia*" (Germer's Mag. Ent., vol. iii, p. 301, 1818). Now, in fact, the swallows and the swifts are not nearly related at all, the swifts finding

their near relations among the night-hawks and hummingbirds. The finding of an immature and an adult female together on the wren, in addition to a single immature specimen on the swallow, allows us to present new evidence of the agreement of the species in generic characters with *Menopon*. The *Menopon* species, *maestum*, described in this paper, serves as an easy step from the more typical *Menopon* type to this peculiar *Eureum* type with its short, broad head, its short, broad prothorax, and long, heavy legs. *Menopon robustum* Kellogg (New Mallophaga, II, 1896, p. 528, pl. lxxii, fig. 3) is of this gradatory type, and presents "a mingling of characters of *Menopon*, *Ancistrona*, and *Eureum*; a short, broad head with strongly chitinized, backward-projecting processes on the ventral surface like *Ancistrona*; a thorax like *Eureum*; and the habitus and general body characters of *Menopon*" (Kellogg, l. c.). Osborn's *M. expansum* (Insects Affecting Domestic Animals, U. S. Dept. Ag., Div. Ent., Bull. N. S., No. 5, 1896, p. 245, pl. ii, fig. j.) from *Dolichonyx oryzivorus* must also be of this general type.

Our immature forms correspond with the description and figure (Piaget, Supplement, p. 139, pl. xv, fig. 3) of the species. Our adult female (figured herewith) shows the following characters not referred to, or unconformable to those in Piaget's description. Body, length 2.25 mm., width 1.15 mm.; head, length .34 mm., width .9 mm.; head less flatly rounded in front than in the young, and with a slight median angulation; on each side of this angulation a conspicuous marginal hair, and farther to the side a longer hair not marginal, but rising from just in front of the base of the antenna. Metathorax with two long hairs and three spines in the posterior angles, the three spines ranged along the

posterior margin. Dorsal surface of the abdomen with a few scattered, longish hairs; ventral surface with groups of short, strong spines and some longish hairs on the lateral part of the posterior margins of segments; last segment broadly rounded behind, with fringe of weak hairs of different lengths.

**Menopon ridulosum** n. sp. (Plate IX, fig. 4).

Specimens from two Yellow Warblers, *Dendroica aestiva* (Palo Alto, California). A small, heavy-bodied form.

Description. Body, length 1. mm., width .53 mm.; being thus a very small species; head large compared with the rest of the body; head almost as wide as long; abdomen with narrow transverse abdominal bands.

Head, length .46 mm., width .51 mm.; large, nearly as broad as the abdomen; front broadly parabolic, with a slight median angulation; two short hairs in front each side of the angle, several shorter hairs in the frontal margin, two longer hairs on the lateral margin, and two long hairs on the angle before the shallow ocular emargination; eye with a black ocular fleck; ocular fringe distinct; two very long hairs on the narrowly rounding temples and several short spines; occipital margin concave, with four long hairs on the margin; two small angular blackish spots on the lateral margin of the front outside the mandibles, which are also dark, showing through the head; ocular blotches curving, blackish brown, fading on the anterior portion of the ocular emargination; a narrow band of dark blackish brown on the occipital margin.

Prothorax wide; a long hair and short spine on the anterior angle; a series of long hairs on the rounding posterior margin; dark transverse and longitudinal

chitin bars distinct, dark brown, while the ground color of the prothorax is even pale fulvous. Mesothorax long, with strongly diverging sides; posterior angles sharp, with several long hairs and broad heavy spines; a series of hairs on the posterior margin; ground color pale fulvous with distinct, narrow chitin bars extending from the anterior angles across the mesothorax, a second pair of chitin bars extending from the lateral margins across the meso- and metathorax. Metathorax narrow; posterior angles with a few long hairs and heavy spines; posterior margin with a series of hairs; intercoxal lines showing through the thorax. Legs pale fulvous with darker marginal markings.

Abdomen broadly elliptical, short; posterior angles with one or two long hairs and some heavy spines; a series of hairs on the posterior margin of the segments, which give place to heavy spines near the lateral margin; a few scattered dorsal spines; last segment flatly rounded, with a few short marginal spines; narrow dark fuscous transverse bands, separated by broad pale transverse bands.

### Physostomum.

We have representatives of this genus from a dozen species of passerine birds, but we do not feel able to make satisfactory specific determination of our material except in a few instances. We do not believe that under the present knowledge of the group much can be done toward distinguishing any but peculiar and obviously characterized species, forms readily separable by marked peculiarity of shape. We have specimens of this genus from the following birds, all from California: Western Wood Pewee, *Contopus richardsonii* (two specimens); Say's Phœbe, *Sayornis saya*; Western

Flycatcher, *Empidonax difficilis*; Ash-throated Flycatcher, *Myiarchus cinerascens*; Spurred Towhee, *Pipilo maculatus megalonyx*; California Towhee, *Pipilo fuscus crissalis*; Cedar Waxwing, *Ampelis cedrorum*; Samuel's Song Sparrow, *Melospiza fasciata samuelis*; Least Vireo, *Vireo bellii pusillus*. In addition, we distinguish the three following species of the genus.

**Physostomum sucinaceum** Kellogg.

New Mallophaga, II, 1896, p. 514, pl. lxx, fig. 2.

Three specimens from a Western Flycatcher, *Empidonax difficilis* (Palo Alto, California). Previously taken by Kellogg from the same host (same locality).

**Physostomum diffusum** Kellogg.

New Mallophaga, II, 1896, p. 518, pl. lxx, fig. 3.

One specimen, var. *pallidum* Kellogg from an Oregon Junco, *Junco hyemalis oregonus* (Pullman, Washington). Taken previously by Kellogg from *Junco* sp. (Lawrence, Kansas).

**Physostomum prominens** n. sp. (Plate IX, fig. 5).

Two specimens from a Costa's Hummingbird, *Calypte costae* (Ontario, California). This strange form with its lateral head margins deeply sinuate and its unique prothorax is very different from any other *Physostomum* described. The specimens are probably not fully mature, one distinctly immature, the other lacking probably only coloration intensity.

Description. Body, length 2 mm., width .85 mm.; transparent whitish; head short and broad, with deeply sinuous lateral margins; eyes in the posterior angles.

Head, length .5 mm., width .53 mm.; broad, short; front broad, straight; conspicuous projecting lateral

palettes; the lateral margins of the head deeply concave before the middle; temples swollen, the margins convex; head widest across the posterior angles which are not produced backwards, but rounding rectangular; the inconspicuous eyes with conspicuous black flecks are situated in the very apex of these angles; each angle bears two longish hairs and one shorter one; posterior margin nearly straight, feebly angulated in the middle; whole head transparent whitish with faint brownish tinge here and there.

Prothorax large, lateral margins with lateral angles broadly and bluntly rounded; posterior margin almost semicircular, with four rather short hairs on each lateral half; pale transparent whitish with faint brownish at margins. Metathorax with rapidly diverging lateral margins, straight posterior margin with two hairs and a spine in region of posterior angles, three hairs near posterior margin just inside of this region, and two hairs and a spine anterior to these submarginal hairs.

Abdomen broadly elliptical; posterior angles not projecting and without conspicuous hairs; on the lateral portion of each segment a group of three hairs near the posterior margin, and a hair and a spine near the lateral margin and more anterior; pale transparent whitish with a pale brown narrow submarginal longitudinal band fading posteriorly.

## LIST OF HOSTS WITH PARASITES.

<i>Echmophorus occidentalis.</i>	<i>Larus heermanni.</i>
<i>Menopon tridens.</i>	<i>Docophorus lari.</i>
<i>Colymbus nigricollis californicus.</i>	<i>Colpocephalum funebre.</i>
<i>Nirmus fusco-marginatus</i> var.	<i>Sterna maxima.</i>
<i>americanus.</i>	<i>Docophorus melanocephalus.</i>
<i>Menopon tridens.</i>	<i>Diomedea albatrus.</i>
<i>Lunda cirrhata.</i>	<i>Nirmus giganticola.</i>
<i>Nirmus pacificus.</i>	<i>Lipeurus diversus.</i>
<i>Colpocephalum perplanum.</i>	<i>densus.</i>
<i>Cerorhinca monocerata.</i>	<i>concinuus.</i>
<i>Nirmus maritimus.</i>	<i>ferox.</i>
<i>Ptychoramphus aleuticus.</i>	<i>Giebelia mirabilis.</i>
<i>Nirmus maritimus.</i>	<i>Eurymetopus taurus.</i>
<i>Synthliboramphus antiquus.</i>	<i>Colpocephalum pingue.</i>
<i>Nirmus maritimus.</i>	<i>Menopon irrumpens.</i>
<i>Cephus columba.</i>	<i>Fulmarus glacialis glupischa</i>
<i>Docophorus procax.</i>	<i>Nirmus maritimus.</i>
<i>Nirmus pacificus.</i>	<i>Puffinus creatopus.</i>
<i>fusco-marginatus</i> var.	<i>Lipeurus diversus.</i>
<i>americanus.</i>	<i>testaceus.</i>
<i>Stercorarius pomarinus.</i>	<i>fuliginosus</i> var. <i>ma-</i>
<i>Docophorus melanocephalus.</i>	<i>lor.</i>
<i>Nirmus triangulatus.</i>	<i>laculatus.</i>
<i>Lipeurus laculatus.</i>	<i>Giebelia mirabilis.</i>
<i>Rissa tridactyla pollicaris.</i>	<i>Menopon paululum.</i>
<i>Nirmus lineolatus</i> var. <i>atri-</i>	<i>Puffinus opisthomelas.</i>
<i>marginatus.</i>	<i>Docophorus validus.</i>
<i>Larus occidentalis.</i>	<i>Lipeurus diversus</i>
<i>Docophorus lari.</i>	<i>testaceus.</i>
<i>Larus argentatus smithsonianus.</i>	<i>limitatus.</i>
<i>Nirmus fusco-marginatus</i> var.	<i>fuliginosus</i> var. <i>ma-</i>
<i>americanus.</i>	<i>lor.</i>
<i>Larus vegø.</i>	<i>Ancistrona gigas.</i>
<i>Nirmus lineolatus</i> var. <i>atri-</i>	<i>Giebelia mirabilis.</i>
<i>marginatus.</i>	<i>Menopon paululum.</i>
<i>Larus delewarensis.</i>	
<i>Docophorus lari.</i>	<i>Puffinus griseus.</i>
<i>Nirmus punctatus.</i>	<i>Nirmus giganticola.</i>
<i>Menopon infrequens.</i>	<i>pacificus.</i>
<i>Larus brachyrhynchus.</i>	<i>Lipeurus diversus.</i>
<i>Nirmus lineolatus</i> var. <i>atri-</i>	<i>limitatus.</i>
<i>marginatus.</i>	<i>Giebelia mirabilis.</i>
<i>Larus canus.</i>	<i>Ancistrona gigas.</i>
<i>Nirmus lineolatus</i> var. <i>atri-</i>	<i>Menopon paululum.</i>
<i>marginatus.</i>	<i>petulans.</i>

- Puffinus tenuirostris.*  
     *Lipeurus diversus.*  
         *limitatus.*  
     *Giebelia mirabilis.*  
*Puffinus bulleri.*  
     *Lipeurus diversus.*  
         *limitatus.*  
     *Giebelia mirabilis.*  
*Phalacrocorax penicillatus.*  
     *Lipeurus farallonii.*  
     *Menopon titan* var. *incompositum.*  
*Pelecanus californicus.*  
     *Lipeurus forficulatus.*  
     *Menopon titan* var. *linearis.*  
*Anas americana.*  
     *Trinoton luridum.*  
*Spatula clypeata.*  
     *Lipeurus squalidus.*  
     *Trinoton lituratum.*  
         *luridum.*  
  
*Aythya marila nearctica.*  
     *Docophorus icterodes.*  
     *Trinoton luridum.*  
*Aythya affinis.*  
     *Docophorus icterodes.*  
*Rallus obsoletus.*  
     *Oncophorus bisetosus* var. *californicus.*  
     *Menopon tridens.*  
*Rallus virginianus.*  
     *Oncophorus bisetosus* var. *californicus.*  
     *Menopon tridens.*  
*Tringa minutilla.*  
     *Docophorus fusiformis.*  
     *Nirmus complexivus.*  
*Calidris arenaria.*  
     *Nirmus actophilus.*  
         *complexivus.*  
     *Colpocephalum spinulosum* var. *minor.*  
*Limosa fedoa.*  
     *Nirmus cordatus.*
- Squatarola squatarola.*  
     *Docophorus fuliginosus.*  
     *Nirmus incœnis.*  
     *Colpocephalum timidum.*  
*Ægialitis semipalmata.*  
     *Docophorus fuliginosus.*  
     *Nirmus opacus.*  
*Oreortyx pictus plumiferus.*  
     *Lipeurus docophoroides* var. *californicus.*  
*Dendragapus obscurus fuliginosus.*  
     *Lipeurus perplexus.*  
*Pediocætes phasianellus columbianus.*  
     *Lipeurus perplexus.*  
     *Goniodes mammillatus.*  
*Elanus leucurus.*  
     *Nirmus fuscus.*  
*Accipiter atricapillus striatulus.*  
     *Nirmus fuscus.*  
*Buteo borealis calurus.*  
     *Nirmus fuscus.*  
*Aquila chrysaëtos.*  
     *Docophorus pictus.*  
     *Colpocephalum flavescens.*  
*Haliæetus pelagicus.*  
     *Colpocephalum flavescens.*  
*Falco sparverius deserticolus.*  
     *Nirmus fuscus.*  
*Asio wilsonianus.*  
     *Docophorus cursor.*  
*Syrnium nebulosum.*  
     *Docophorus speotyti.*  
*Scotiaptex cinerea.*  
     *Oncophorus remotus.*  
*Nyctea nyctea.*  
     *Docophorus ceblebrachys.*  
*Dryobates pubescens gairdnerii.*  
     *Menopon funereum.*  
*Dryobates nuttallii.*  
     *Docophorus singularis.*  
*Xenopicus albolarvatus.*  
     *Docophorus californiensis.*  
*Sphyrapicus thyroideus.*  
     *Docophorus californiensis.*



- Melanerpes formicivorus bairdi*.  
     *Docophorus californiensis*.  
*Trochilus alexandri*.  
     *Nirmus vulgatus*.  
*Calypte costæ*.  
     *Physostomum prominens*.  
*Tyrannus verticalis*.  
     *Nirmus fœdus*.  
*Myiarchus cinerascens*.  
     *Docophorus communis*.  
         *rufus*.  
         *fusco-ventralis*.  
     *Nirmus vulgatus*.  
         *fœdus*.  
     *Physostomum sp.*  
     *Menopon distinctum*.  
*Sayornis saya*.  
     *Nirmus fœdus*.  
     *Physostomum sp.*  
*Contopus richardsonii*.  
     *Physostomum sp.*  
*Empidonax difficilis*.  
     *Docophorus communis*.  
     *Nirmus vulgatus*.  
         *ductilis*.  
     *Physostomum sp. sucinaceum*.  
*Otocoris alpestris chrysolæma*.  
     *Docophorus communis*.  
*Cyanocitta stelleri frontalis*.  
     *Docophorus communis*.  
     *Nirmus vulgatus*.  
*Aphelocoma californica*.  
     *Docophorus communis*.  
     *Menopona persignatum*.  
*Sturnella magna neglecta*.  
     *Docophorus communis*.  
*Scolecophagus cyanocephalus*.  
     *Docophorus communis*.  
*Coccothraustes vespertinus montanus*.  
     *Menopon funereum*.  
*Carpodacus mexicanus frontalis*.  
     *Nirmus vulgatus*.
- Spinus pinus*.  
     *Docophorus communis*.  
*Chondestes grammacus strigatus*.  
     *Docophorus communis*.  
     *Nirmus vulgatus*.  
     *Menopon incertum*.  
*Zonotrichia leucophrys intermedia*.  
     *Docophorus communis*.  
*Zonotrichia leucophrys gambelii*.  
     *Docophorus communis*.  
*Zonotrichia coronata*.  
     *Docophorus communis*.  
     *Nirmus vulgatus*.  
     *Menopon mæstum*.  
*Spizella sp.*  
     *Docophorus communis*.  
*Spizella socialis arizonæ*.  
     *Docophorus communis*.  
*Junco hyemalis oregonus*.  
     *Physostomum diffusum*.  
*Junco hyemalis thurberi*.  
     *Docophorus mirinotatus*.  
*Amphispiza belli*.  
     *Docophorus communis*.  
     *Nirmus lautiusculus*.  
*Melospiza fasciata heermanni*.  
     *Colpocephalum grandicolum*.  
*Melospiza fasciata samnelis*.  
     *Docophorus communis*.  
     *Physostomum sp.*  
     *Menopon mæstum*.  
*Pipilo maculatus megalonyx*.  
     *Nirmus vulgatus*.  
     *Physostomum sp.*  
*Pipilo fuscus crissalis*.  
     *Docophorus communis*.  
     *Nirmus vulgatus*.  
     *Colpocephalum grandicolum*.  
     *Physostomum sp.*  
*Zamelodia melanocephala*.  
     *Docophorus communis*.  
*Guiraca cærulea eurhyncha*.  
     *Docophorus communis*.  
     *Nirmus vulgatus*.

- Passerina amœna.*  
     *Nirmus vulgatus.*  
*Piranga ludoviciana.*  
     *Docophorus communis.*  
*Petrochelidon lunifrons.*  
     *Menopon malleus.*  
*Chelidon erythrogastra.*  
     *Nirmus longus* var. *domesticus.*  
*Ampelis cedrorum.*  
     *Docophorus communis.*  
     *Nirmus brachythorax.*  
     *Physostomum* sp.  
*Phainopepla nitens.*  
     *Nirmus fœdus.*  
*Lanius borealis.*  
     *Docophorus communis.*  
*Lanius ludovicianus gambeli.*  
     *Docophorus communis.*  
     *Nirmus fœdus.*  
*Vireo solitarius plumbeus.*  
     *Docophorus communis.*  
*Vireo bellii pusillus.*  
     *Physostomum* sp.  
*Helminthophila celata lutescens.*  
     *Nirmus vulgatus.*  
*Dendroica æstiva.*  
     *Docophorus communis.*
- Dendroica æstiva.*  
     *Nirmus vulgatus.*  
     *Menopon ridulosum.*  
*Icteria virens longicauda.*  
     *Nirmus fœdus.*  
*Cinclus mexicanus.*  
     *Nirmus vulgatus.*  
*Heleodytes brunneicapillus.*  
     *Menopon malleus.*  
             *distinctum.*  
*Thryothorus bewickii spilurus.*  
     *Docophorus communis.*  
             *mirus.*  
     *Menopon incertum.*  
*Parus inornatus.*  
     *Docophorus communis.*  
*Parus gambeli.*  
     *Nirmus vulgatus.*  
*Parus rufescens neglectus.*  
     *Nirmus vulgatus.*  
*Turdus ustulatus.*  
     *Menopon incertum.*  
*Turdus aonalaschkæ auduboni.*  
     *Docophorus communis.*  
*Sialia mexicana occidentalis.*  
     *Docophorus communis.*  
     *Nirmus vulgatus.*

## EXPLANATION OF PLATES.

PLATE V.—Fig. 1, *Docophorus procax* Kellogg and Chapman, ♀. Fig. 2, *D. validus* Kellogg and Chapman, ♀. Fig. 3, *D. fusiformis* Denny, ♂. Fig. 4, *D. pictus* Giebel, ♀. Fig. 5, *D. singularis* Kellogg and Chapman, ♀. Fig. 6, *D. mirinotatus* Kellogg and Chapman, ♀. Fig. 7, *D. mirus* Kellogg and Chapman, ♀. Fig. 8, *Nirmus pacificus* Kellogg and Chapman, ♀. Fig. 9, *N. fusco-marginatus* Denny, var. *americanus* Kellogg and Chapman, ♀.

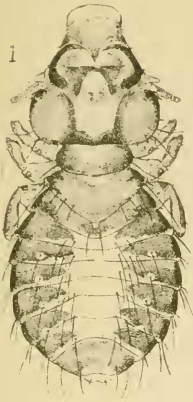
PLATE VI.—Fig. 1, *Nirmus maritimus* Kellogg and Chapman, ♀. Fig. 2, *N. triangulatus* Nitzsch, ♀. Fig. 3, *N. complexivus* Kellogg and Chapman, ♀. Fig. 4, *N. actophilus* Kellogg and Chapman, ♀. Fig. 5, *N. incanis* Kellogg and Chapman, ♀. Fig. 6, *N. opacus* Kellogg and Chapman, ♀. Fig. 7, *N. fedus* Kellogg and Chapman, ♀. Fig. 8, *N. ductilis* Kellogg and Chapman, ♀. Fig. 9, *N. lautiusculus* Kellogg and Chapman, ♂.

PLATE VII.—Fig. 1, *Lipeurus laculatus* Kellogg and Chapman, ♂. Fig. 2, *L. concinnus* Kellogg and Chapman, ♂. Fig. 3, *L. fuliginosus* Taschenberg, var. *major* Kellogg and Chapman, ♂. Fig. 4, *L. farallonii* Kellogg, ♂. Fig. 5, *L. perplexus* Kellogg and Chapman, ♀. Fig. 6, *Oncophorus bisetosus* Piaget, var. *californicus* Kellogg and Chapman, ♀. Fig. 7, *O. remotus* Kellogg and Chapman, ♂. Fig. 8, *Colpocephalum perplanum* Kellogg and Chapman, ♀. Fig. 9, *C. spinulosum* Piaget, var. *minor* Kellogg and Chapman, ♂. Fig. 10, *C. grandiculum* Kellogg and Chapman, ♀.

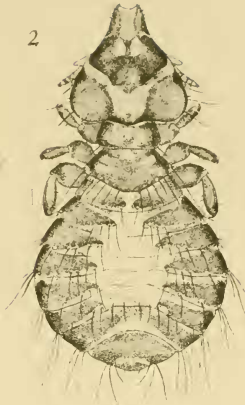
PLATE VIII.—Fig. 1, *Menopon irrumpens* Kellogg and Chapman, ♀. Fig. 2, *M. paululum* Kellogg and Chapman, ♀. Fig. 3, *M. petulans* Kellogg and Chapman, ♂. Fig. 4, *M. titan* Piaget, var. *incompositum* Kellogg and Chapman, dorsal aspect of one abdominal segment. Fig. 5, *M. titan* Piaget, var. *incompositum* Kellogg and Chapman, ventral aspect of last segments of abdomen of ♂. Fig. 6, *M. funereum* Kellogg and Chapman, ♂. Fig. 7, *M. distinctum* Kellogg and Chapman, ♀.

PLATE IX.—Fig. 1, *Menopon persignatum* Kellogg and Chapman, ♀. Fig. 2, *M. mæstum* Kellogg and Chapman, ♀. Fig. 3, *M. malleus* Nitzsch, ♀. Fig. 4, *M. ridulosum* Kellogg and Chapman, ♀. Fig. 5, *Physostomum prominens* Kellogg and Chapman.

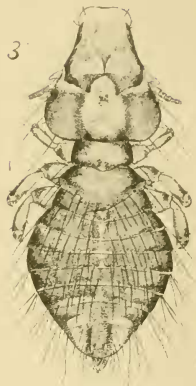
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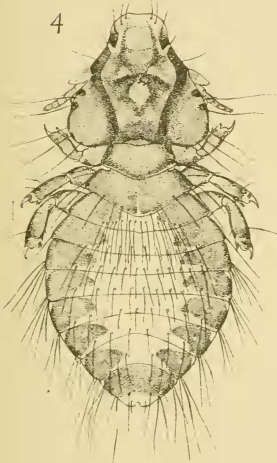
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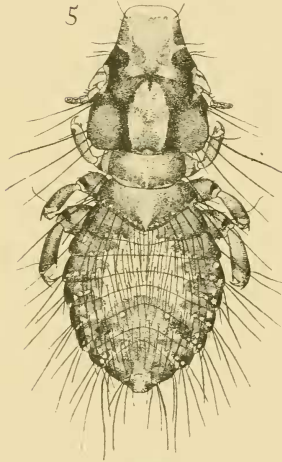
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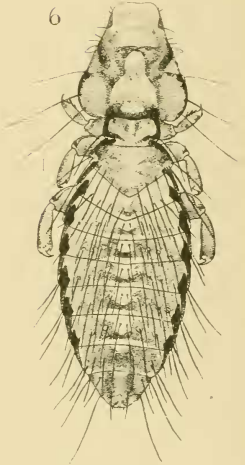
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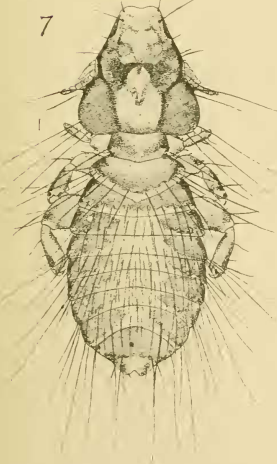
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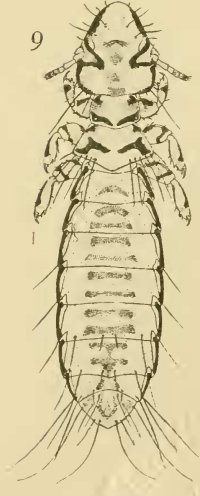
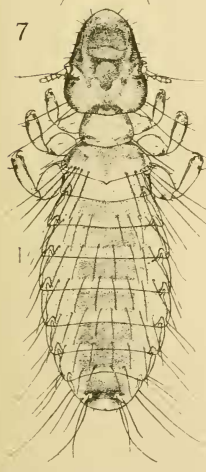
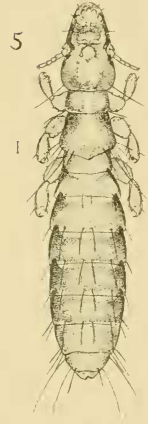
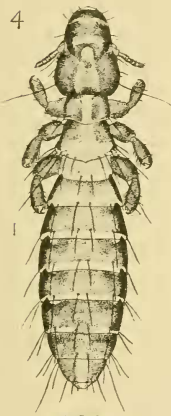
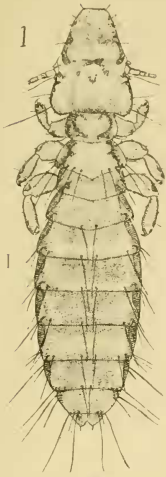


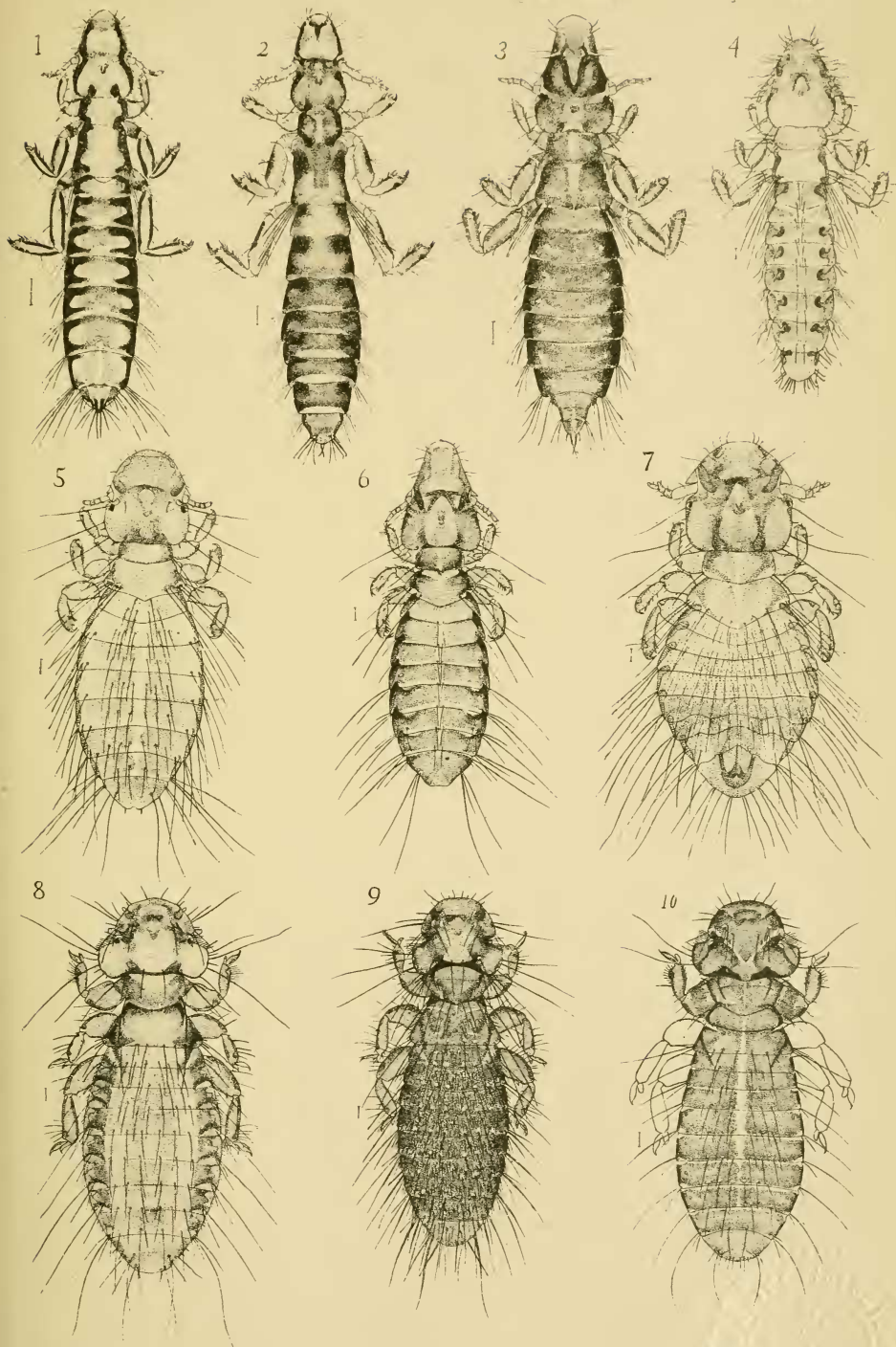
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